SUMMER 2024

AI – Peril or Promise?

BCS.

the digital built asset consultancy

iXConsulting

Executive Summary

The proliferation of artificial intelligence (AI) has revolutionised various industries, from healthcare to finance, by enabling advanced data processing and decision-making capabilities. Central to this technological leap are AI data centres, specialised facilities that house the hardware and software necessary for AI computations. While these centres are crucial for AI advancements, they also significantly impact power and water usage, presenting both challenges and opportunities for sustainability and resource management.

AI data centres are power-intensive by nature, primarily due to the high computational demands of AI workloads. Machine learning algorithms, especially deep learning models, require substantial processing power, often involving thousands of GPUs or TPUs running in parallel. These computational resources consume large amounts of electricity. The International Energy Agency (IEA) highlighted that data centres that after globally consuming an estimated 460 terawatt-hours (TWh) in 2022, data centres' total electricity consumption could reach more than 1 000 TWh in 2026. This demand is roughly equivalent to the electricity consumption of Japan. The energy consumption of AI data centres is driven not only by the need to power the servers but also by the cooling systems required to maintain optimal operating temperatures.

The environmental impact of this power usage is significant. Many data centres are still reliant on non-renewable energy sources. Efforts are being made to transition to renewable energy, but the pace of AI advancement often outstrips these sustainability initiatives. For instance, leading tech companies like Google and Microsoft have committed to carbon neutrality and investing in renewable energy, yet the rapid expansion of their AI capabilities continues to pose sustainability challenges.

In addition to power usage, AI data centres also have a substantial impact on water resources. Traditional water-cooled data centres can consume millions of gallons of water annually. According to The World Counts, an open-source community-driven project that aggregates consumption data from organisations around the world, more than 4.3 trillion cubic meters (approximately 1.1 quadrillion gallons) of water are consumed by data centres globally every year. This usage can strain local water supplies, especially in regions facing water scarcity. The environmental cost of water-intensive cooling solutions is exacerbated in drought-prone areas, where the diversion of water to data centres can compete with agricultural and residential needs.

The interplay between AI data centres and resource usage necessitates innovative approaches to mitigate environmental impacts. Advances in cooling technology, such as liquid immersion cooling and the use of recycled water, offer potential solutions. Furthermore, utilising recycled or non-potable water for cooling can alleviate the pressure on freshwater resources.

Moreover, AI itself can be leveraged to enhance the efficiency of data centres. AI algorithms can optimise energy use by predicting cooling needs, managing workloads more efficiently, and reducing idle times for servers. Predictive maintenance powered by AI can also prevent equipment failures, thereby reducing the need for excessive cooling.

In conclusion, while AI data centres are indispensable for the continued advancement of artificial intelligence, their impact on power and water usage poses significant environmental challenges. Addressing these issues requires a multifaceted approach that includes transitioning to renewable energy, adopting innovative cooling technologies, and leveraging AI for operational efficiency. As the demand for AI capabilities continues to grow, so too must our efforts to ensure that this growth is sustainable and responsible, balancing technological progress with environmental stewardship. At BCS, we help clients navigate this path to deliver optimum locations and positive outcomes for our global community.

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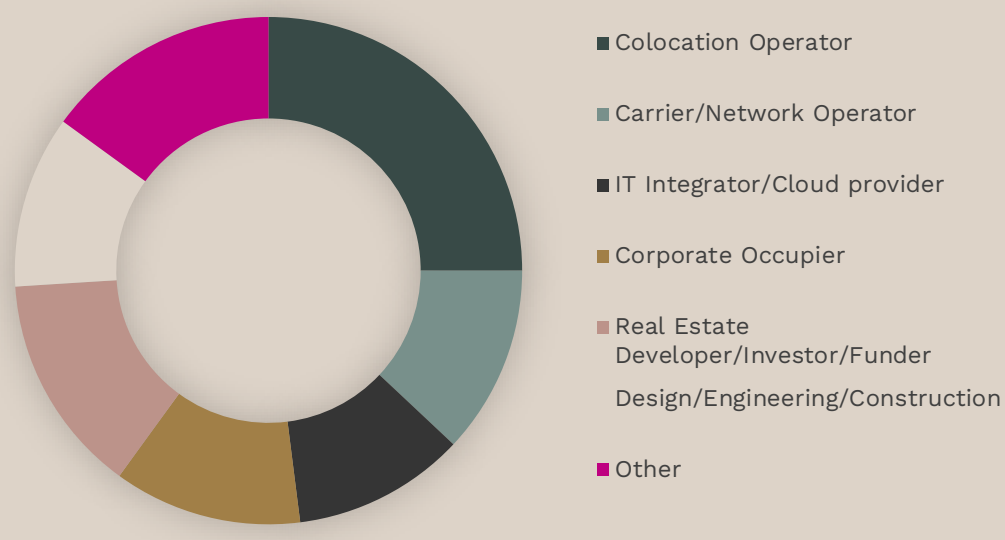
Introduction

Welcome to our latest data centre survey – the 28th edition conducted by iX Consulting, an independent research firm specialising in data centre economic analysis, and sponsored by BCS, a leading provider of integrated IT asset consultancy solutions. Our report analyses the views of a wide selection of market practitioners including owners, operators, service providers, developers, investors, consultants and end users of data centres providing insight into the ongoing health of the sector in Europe.

Undertaken in April and early May, the survey draws on the views of our respondents against a background of generally improving economic news following a prolonged period of economic stagnation, albeit still sitting in the shadow of the continuing instability caused by wars in Ukraine and Gaza. It's within this context that we sought the views of survey participants on both the current health and future prospects for the European data centre industry.

What is your primary relationship with the data centre industry?

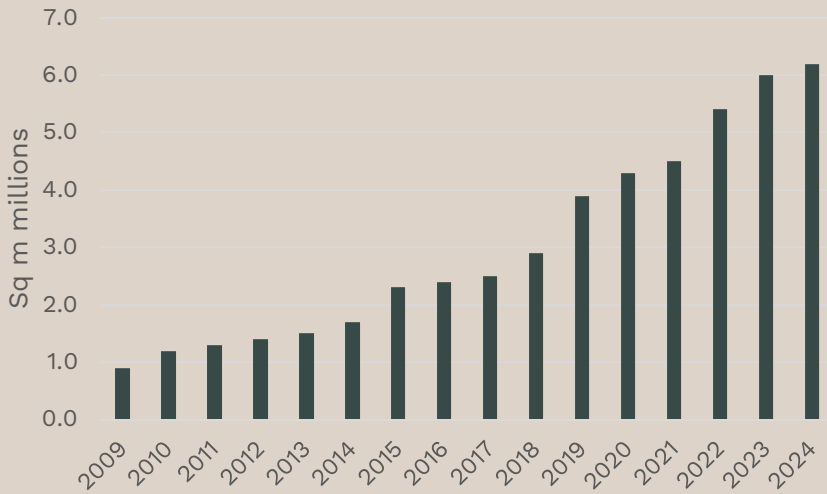


Whilst demand for IT services continues to grow with little indication of any potential slowdown soon, the data centre industry faces several challenges to service this expansion. Some of these challenges are well established: the ability to source sufficient power with a renewable provenance, shortages of skilled staff, availability of fit-for-purpose facilities. Others, such as supply chain difficulties for example, are more recent, catalysed by the global pandemic period and exacerbated by global geopolitical instability.

One of the key subjects that has been present over the past few years, but really forced its way to the surface of public consciousness in the last six months has been the growth of AI - Artificial Intelligence. There are two main areas of analysis regarding AI and the data centre industry: demand-led issues and how AI driven demand may influence the product, and the use of AI itself in the design and operation of data centres. We spend some time in this report examining our survey respondents' attitudes around these issues.

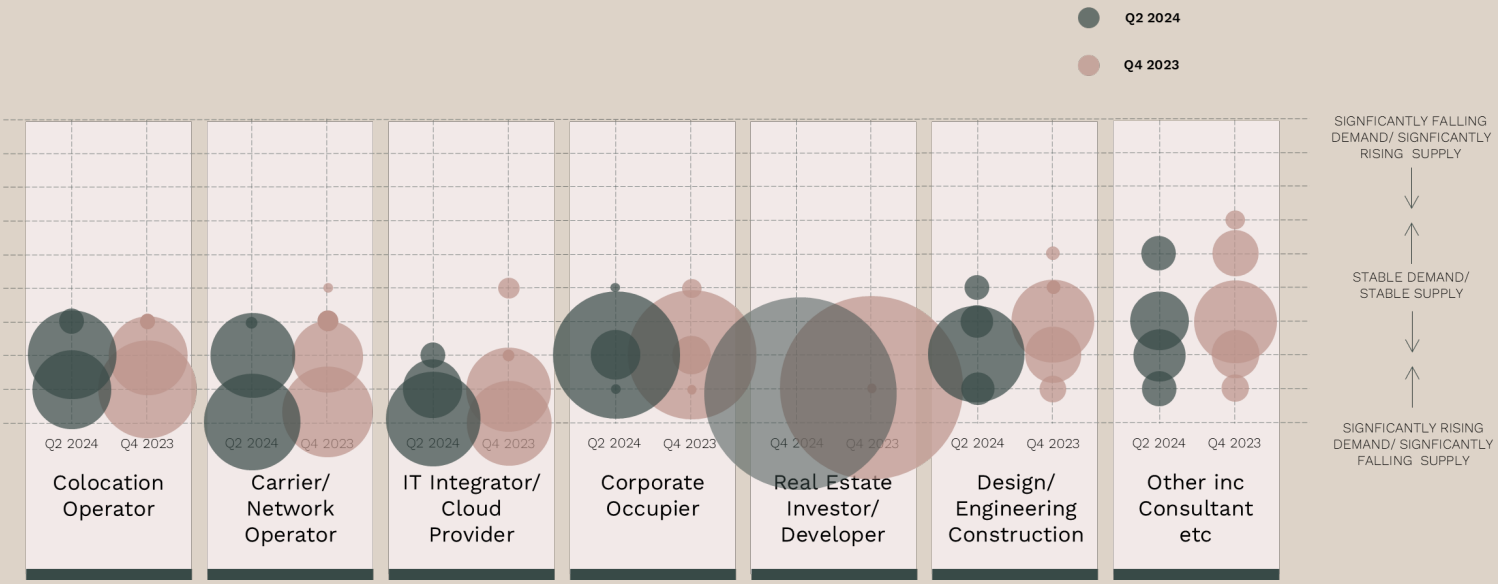
Our respondents represent a comprehensive and varied group of organizations involved in real estate, investment, colocation, telecom, IT and managed service industries throughout Europe. These stakeholders include service providers, developers, financiers and corporate occupiers who own or manage data centre portfolios comprising approximately six million square meters of technical floorspace based in 40 countries across Europe.

Total Technical floorspace



In this report, 15 years after our first European-wide reporting started, our views are collected from respondents who either own, operate or contract with over 6.2 million square meters of technical real estate across 40 European countries, continuing to underpin the longest running and most comprehensive report of its kind.

The Supply/Demand dynamic



- Future demand for data centres shows no sign of slowing with the European data centre market likely to continue to thrive. Our latest survey once again indicating a confidence of decreasing supply whilst demand is increasing - sentiment shared by 95% of survey participants, up from the 91% recorded in our last survey in Q4 2023.
- For the fifth successive survey there is entire agreement amongst respondents that demand will either increase or remain the same over the coming year. Not one respondent expects to see demand falling.
- All developer and investor respondents expect a continuation of rising demand over the next year, a sentiment recorded for the seventh survey in a row, and once again demonstrating this group's position as the most bullish sector of respondents.
- In addition, suppliers of data centre services continue to hold buoyant views regarding the balance between supply and demand in the market. For the third survey in succession all our colocation providers indicate rising demand.
- Amongst our carriers/network operators and IT integrators, respondents also continue to illustrate their ongoing confidence, with total agreement amongst this sector that the coming year will continue to see falling supply and rising demand; up from 97% recorded last winter.
- Amongst our corporate respondents, we have seen an uplift in those believing that the market is characterised by rising demand and falling supply levels; some 95% expressed this view up on the 90% reported six months ago.

Ownership & Management

The ability to maintain control of their own facilities remains a major requirement for our colocation operators, carriers and IT integrators/cloud providers; almost four-fifths of whom reporting that 80% or more of their data centre portfolio was internally managed, a proportion in line with the long-term average monitored over the past 15 years. These levels of operational control allow providers the flexibility and speed of decision-making to satisfy changing client demands and timelines. In addition, it also allows them to drive operational efficiencies into their environments without the potential constraints that a superior third-party provider could present.

Whilst this self-managed approach remains the preferential business model for service providers, there is a contrast with the requirements of most corporate respondents. Once again amongst end users we record a large proportion opting for the outsourcing solution as an attractive option; around four-fifths of whom indicated that at least 80% or more of their portfolio is managed via a third-party, a proportion that has remained largely unchanged over the past two years.

Whilst the benefits of third-party solutions are evident – avoiding substantial CAPEX outgoings related to data centre build-outs and offering service flexibility - it may not provide a complete solution for all. There is evidence that a blended approach also appeals, mixing the benefits of both external and in-house manged solutions, maintaining a degree of ownership control over elements of their data centre infrastructure whilst also incorporating third-party estates where flexibility and/or more specialist products are needed – for instance very high-power densities.

Utilisation

The desire to ensure that data centre footprints are being used in the most efficient manner is a natural requirement for our respondents and one which we have been able to measure constantly since our survey work began. As we have identified in recent surveys, the pattern of utilisation of internal and external solutions continues to vary. For all users of third-party data centres, this requirement to maximise efficiencies, allied to the need to keep flexible contracts to facilitate a response to business demands, has generally resulted in higher overall utilisation rates. Some two-fifths of respondents indicating that over 80% of their technical footprint was being actively used remains in line with the proportion recorded in our last survey.

Notably, among our corporate respondents this proportion jumps to nearly 90% - a rise on the 83% reported six months ago, reflecting the need to maximise the use of all IT environments and minimising expensive under-used space. This same group reported 60% utilisation rates for their in-house managed facilities.

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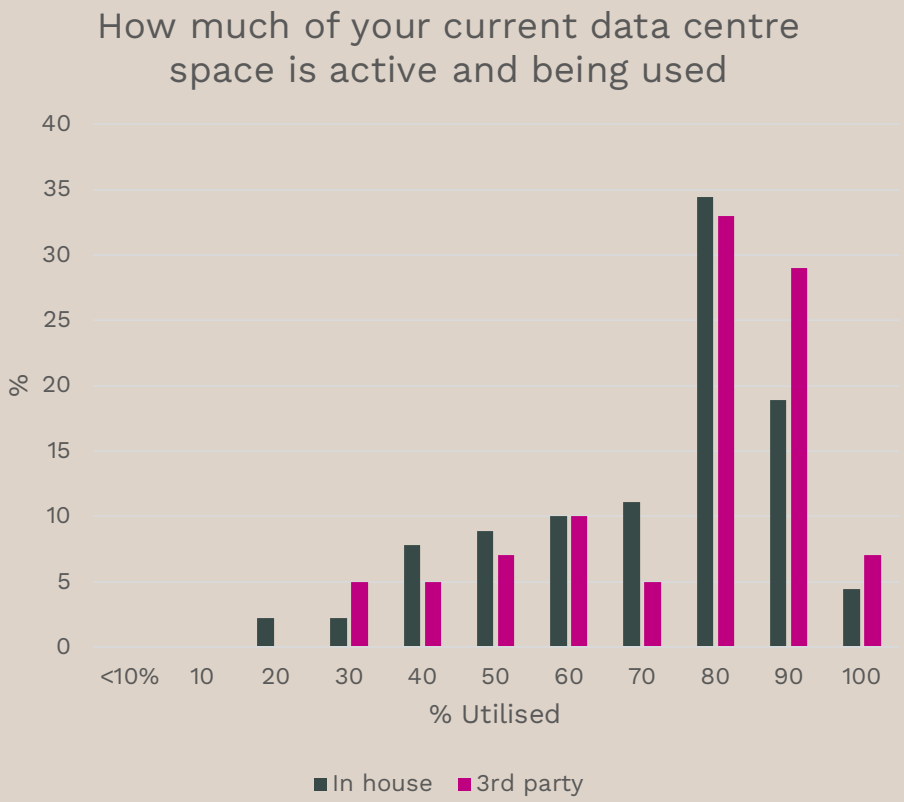
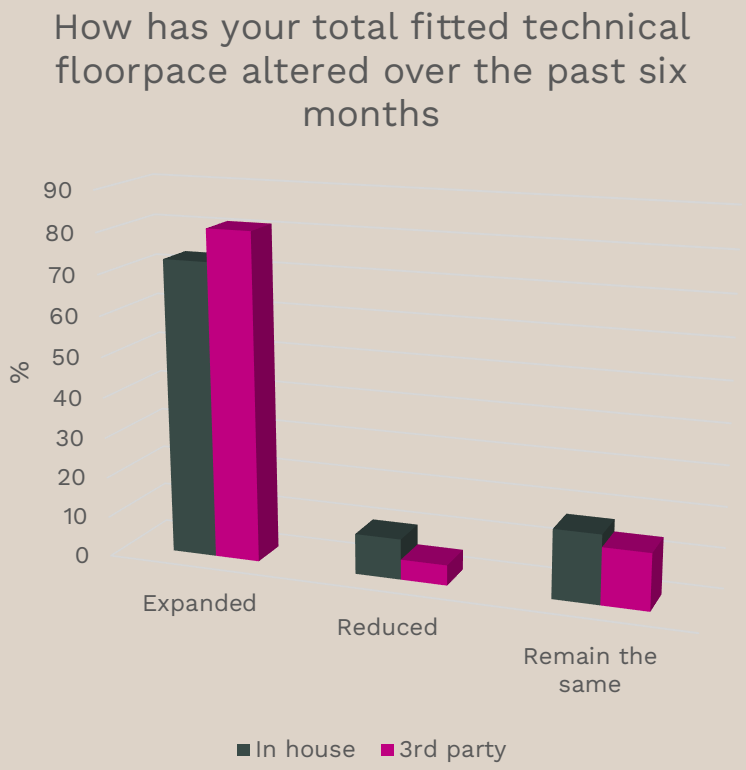
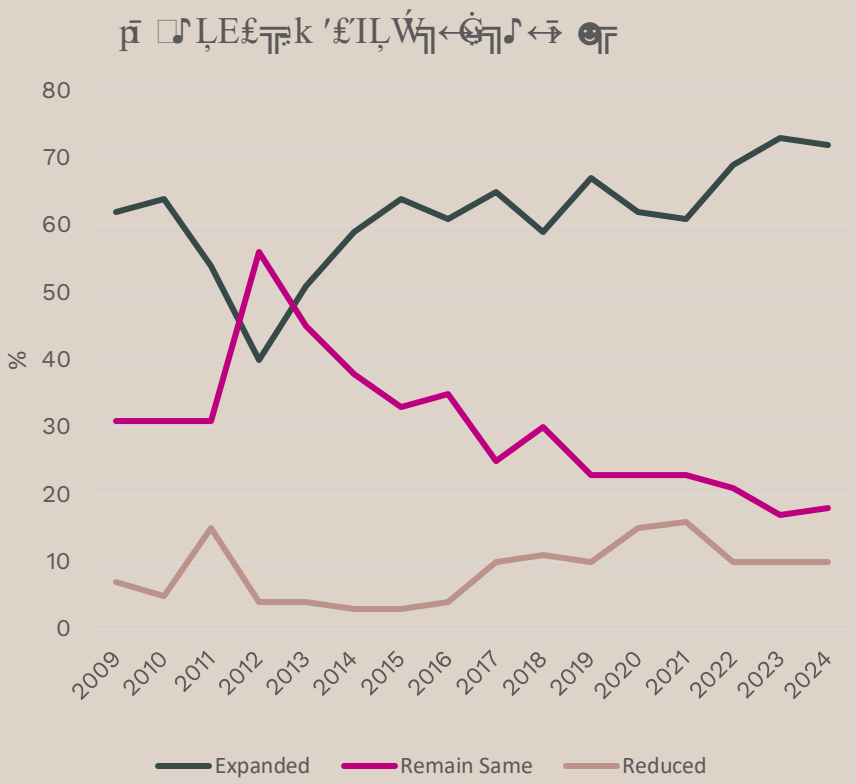
Further evidence of positive expectations on continued rising levels of demand is provided by our respondents' activity regarding third-party space expansion since our last survey. Some 81% reported an increase in their externally managed solutions over this period, approximately the same as recorded in Q4 2023 and notably a considerable level above the long-term average of around 60%. In addition, 14% reported no change in their third-party portfolio and only 5% reported a reduction in this type of occupation.



Expansion Ongoing



As already noted, there is an almost unfaltering expectation amongst our survey respondents that demand for IT services will continue moving forward. This positivity is reflected in our findings that for the third survey running some three-quarters of respondents' report that they had increased their in-house managed data centre capacity in the preceding six-month period. In contrast, those who indicated reducing their in-house floorspace had simultaneously fallen to 10% from 17% reported in winter 2023, whilst those participants indicating no change sits at 17%.



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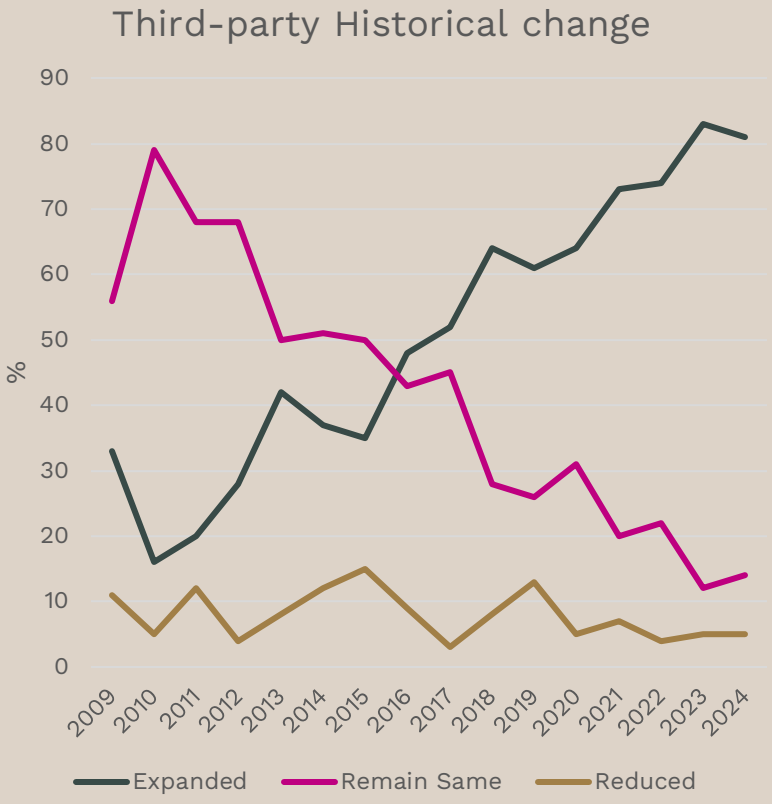
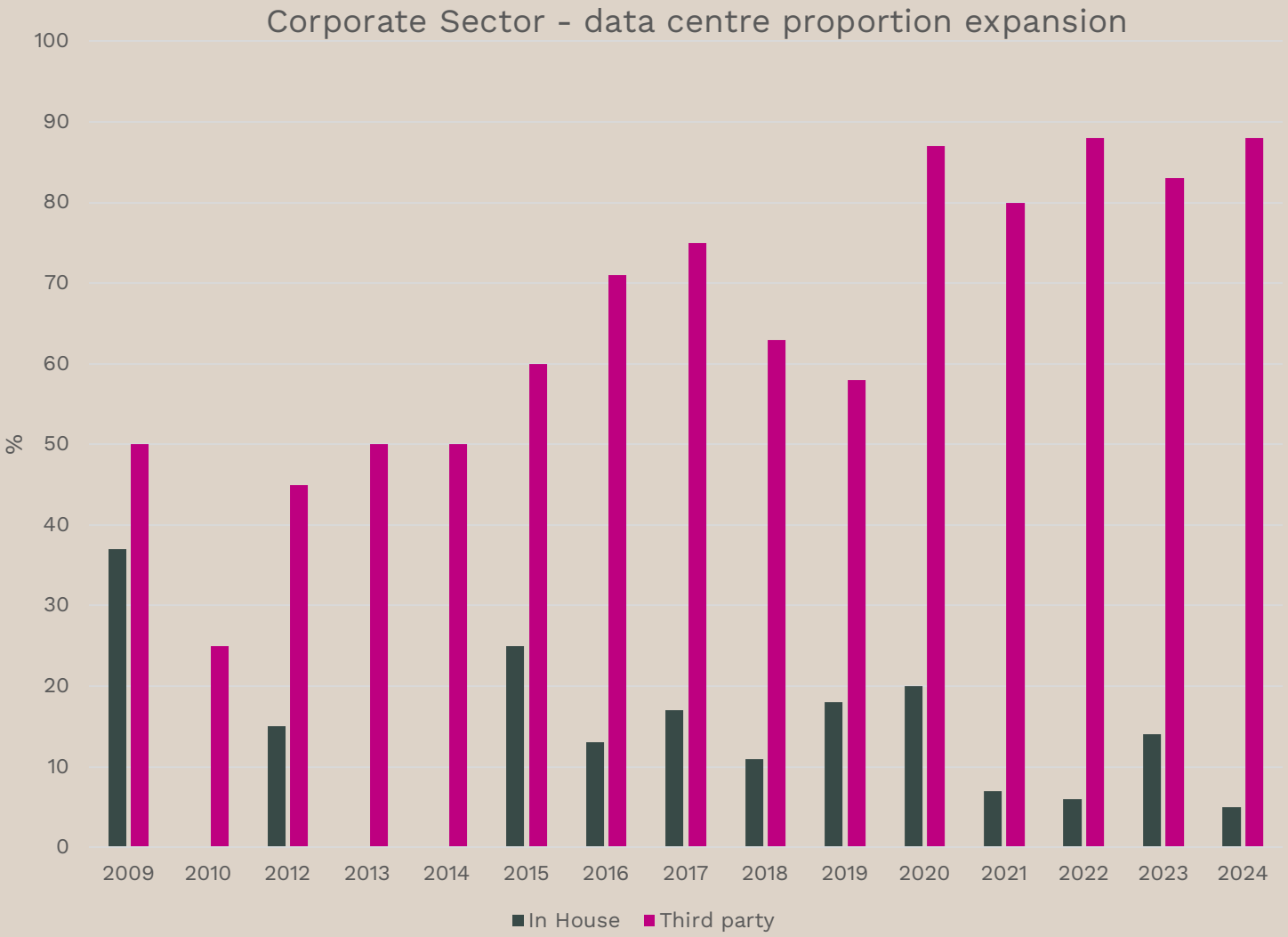
Amongst our service provider respondents, colocation operators continue to lead the way in terms of expansion, with almost all - 98% - indicating increases of their own stock during the previous six months; marginally up on the 95% recorded in our last survey. In addition, 95% of our carrier/network operator and IT integrator/cloud provider respondents reported expansions on their own facilities over the period. These levels of expansion provide clear evidence that service providers maintain a high degree of confidence that demand from end users will remain buoyant and are positioning themselves to respond quickly to meet this demand. .





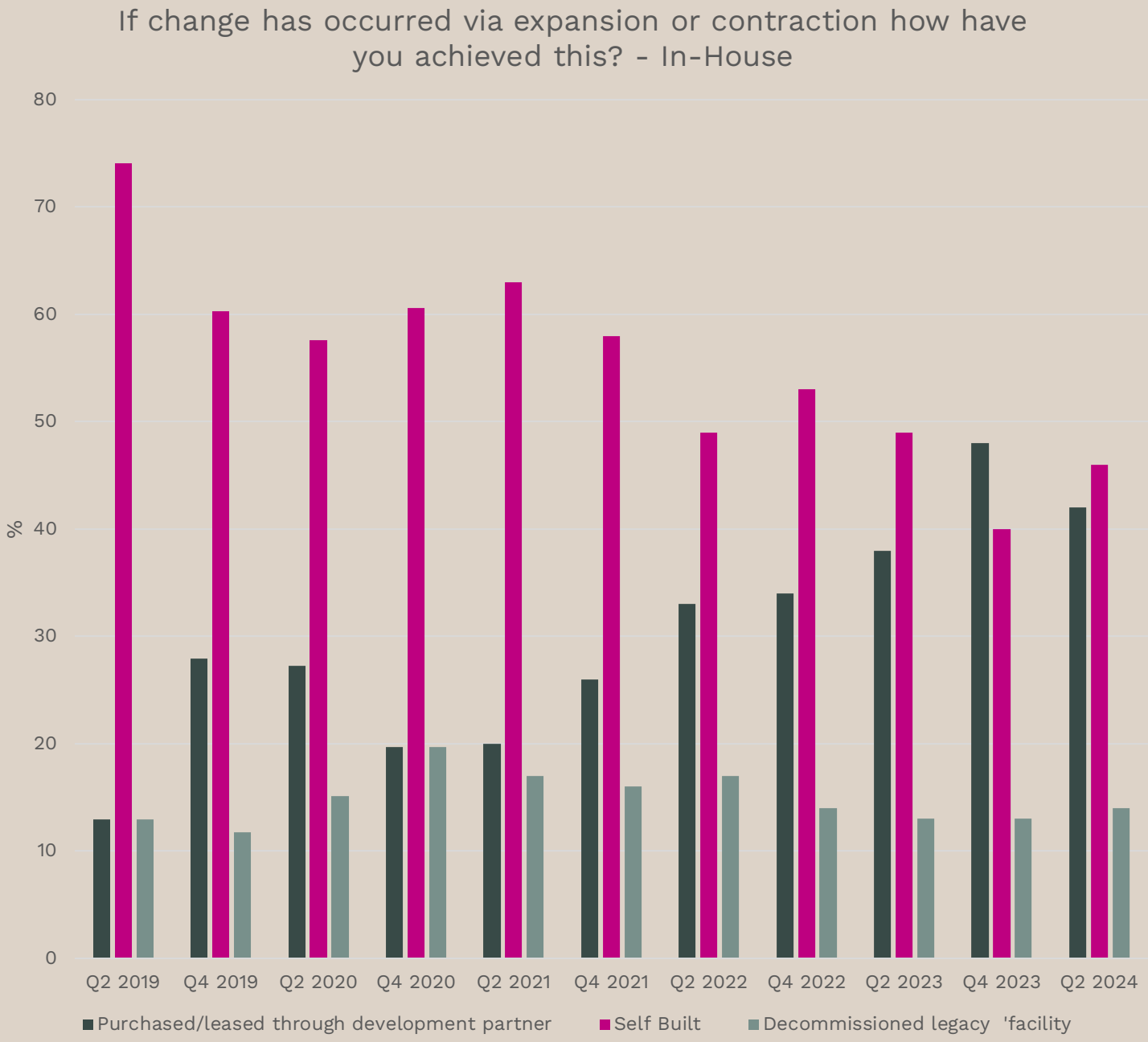
Amongst our corporate respondents, just 11% indicated an increase in their in-house technical floor space over the past six months; a fall from 14% recorded in our last survey. At the same time, we have seen an increase in the proportion who reported that they had reduced self-managed stock; 58% reported that this was the case, up from 52% six months earlier. This suggests that end users continue to move in favour of an outsourced model for occupying data centre space. Indeed, some 88% of end users indicated a rise in the number of expansions in third-party facilities over the period, up from the 83% reported in our last survey.

Our latest survey has identified a slight decrease in the number of third-party managed data centre expansions since our last winter publication; some 81% of our respondents indicated an increase in the previous six months compared to 83% recorded at the end of 2023. This marginal decline is mostly due to one sector - our service providers. Currently, 81% of them reported an expansion of third-party space over the past six months compared with 86% who reported on the same metric in our preceding report.

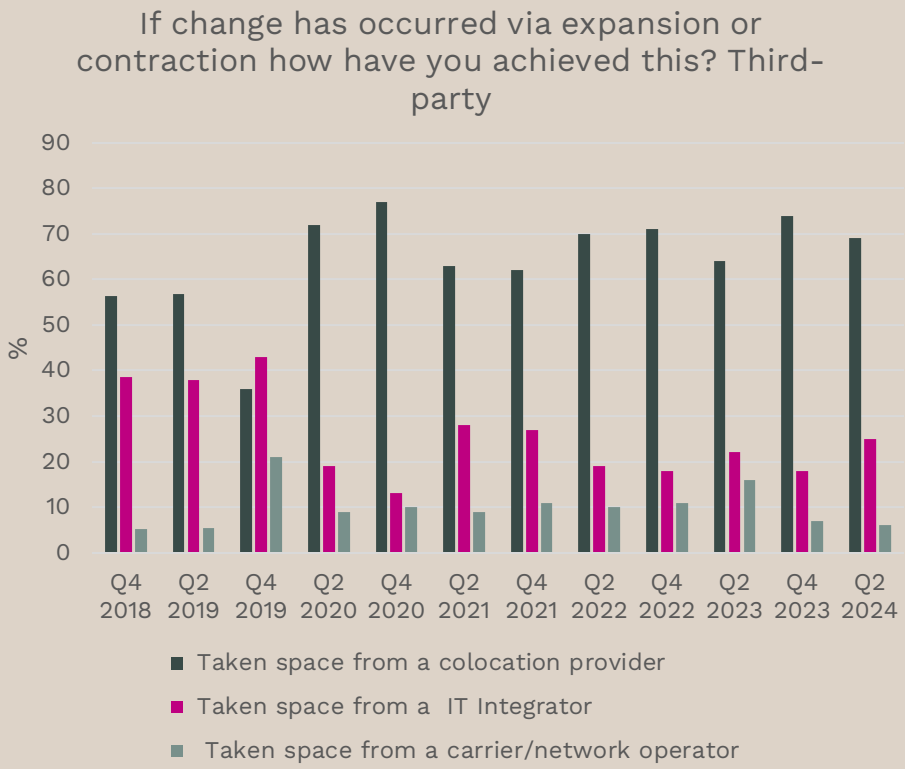
How was expansion achieved?

The choice of routes for expansion of self-managed facilities in our latest survey are similar to those recorded previously. The self-build route has again been the most popular, with around 46% of respondents using it, akin to that recorded six months earlier. Similarly, the option of purchasing or leasing through a development partner was followed by just over two-fifths of respondents; in line with the proportion recorded at the end of 2023.

Around 14% reported that they have reduced their tech space through the decommissioning of a legacy facility - the majority of these being corporate end users – recording a slight rise on the 12% that we reported six months ago.

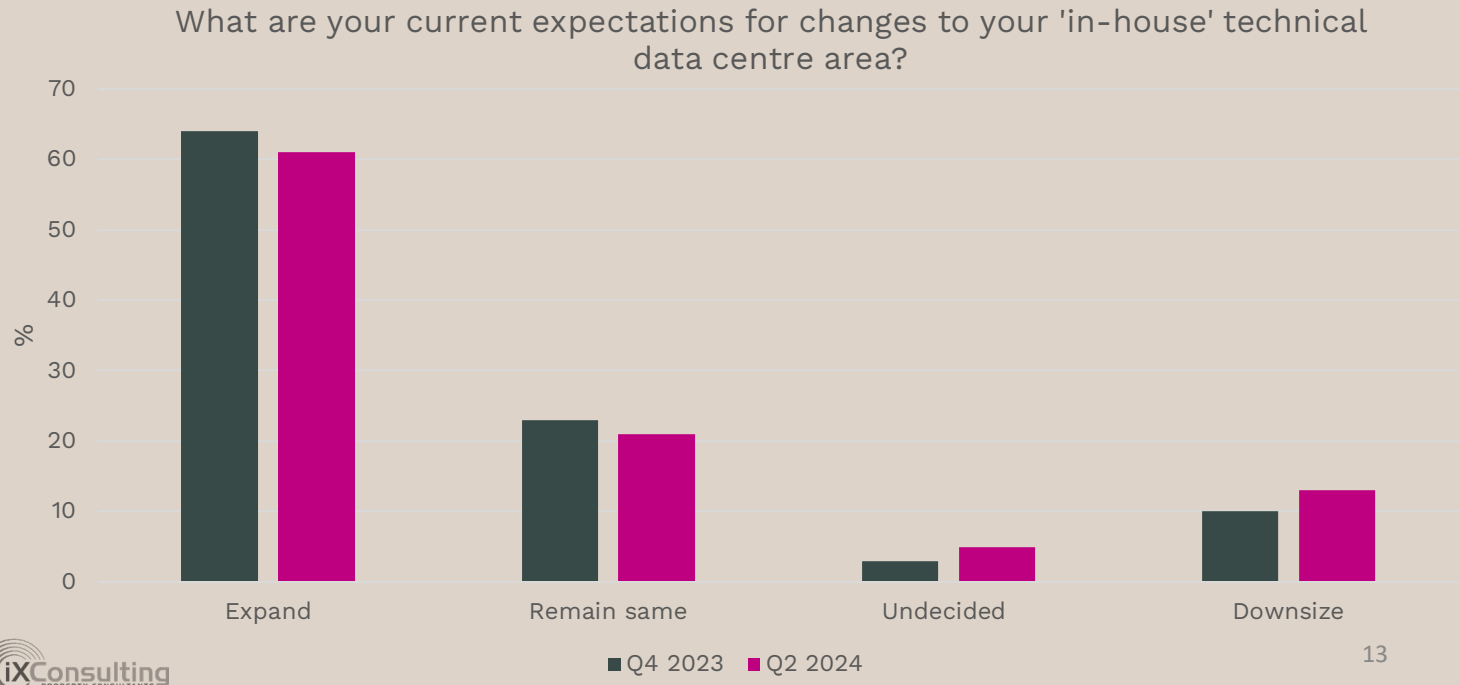


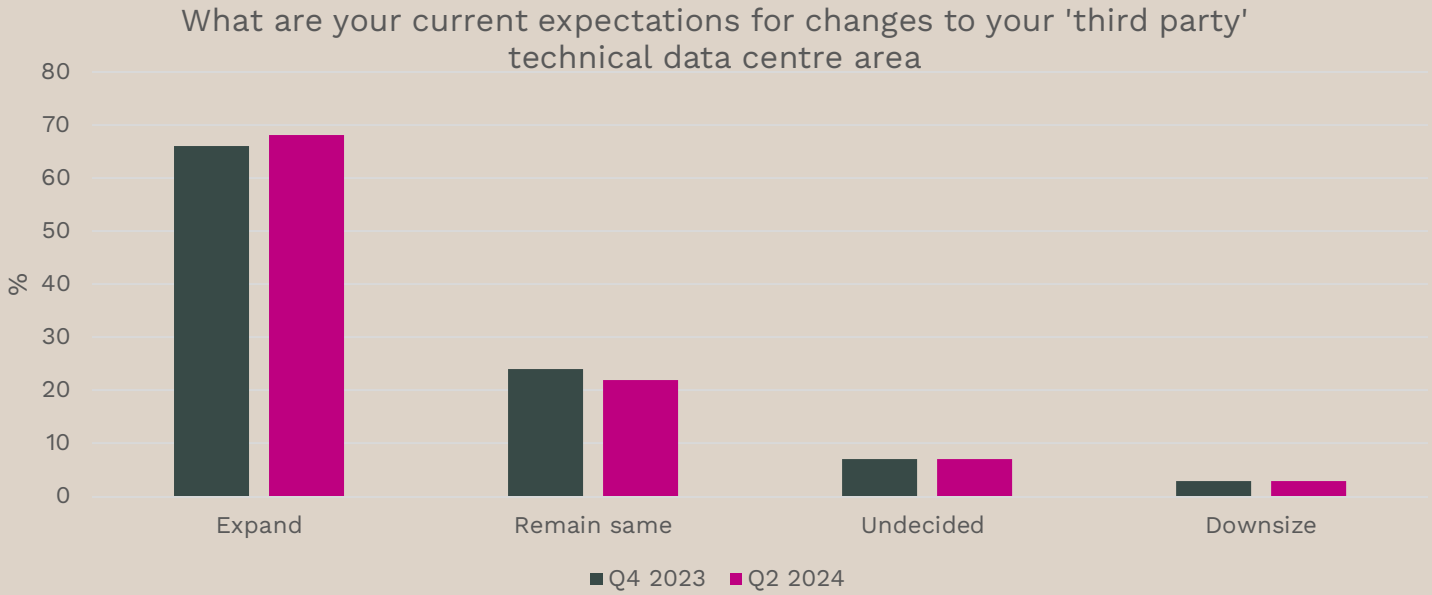
In terms of externally managed expansion, taking space from a colocation partner remains the most popular option with some 69% of respondents indicating that they had chosen this route, followed by IT integrators, carriers, and network providers. It is noted that 15% of respondents indicated that they had chosen a multi-supplier route, again similar levels to that seen in Q4 2023. In these cases, there may be influences from several drivers: availability of product, pricing, or geography. It stands to reason that changes in demand requirements driven by diverse needs of enterprises would be better met by different outsourced solutions.



No slowdown in expansion plans

Looking further forward, the latest survey provides further evidence of a degree of ongoing positivity regarding expectations of future demand. Some 61% of respondents expect to see an expansion in the coming year to their self-managed technical floor space portfolios, a slight decline on the 64% reported in our last survey, but still well above the long-term average.





Once again service-provider respondents have been the most confident, with some 92% reporting this, a significant increase on the 84% who disclosed the same in winter 2023. The proportion of participants indicating they would reduce their in-house data centre space remains relatively low at just 13%, albeit a rise on the 10% noted previously. The share of those participants who believe that there will be “no change” in the amount of their in-house data centre space over the next year has also shown a marginal decline since our last survey at 21%, down from 24%, whilst those respondents who are undecided has remained low at 5%.

Amongst our end users, evidence suggest that their approach to future in-house facilities is markedly different to that of the IT suppliers. Last winter we reported that 16% of corporates are intending to expand self-managed facilities over the next year contrasted to the 84% of service providers. In our latest survey, this trend appears to have become more marked with just 5% of corporates now suggesting that they will expand their in-house data centre space.

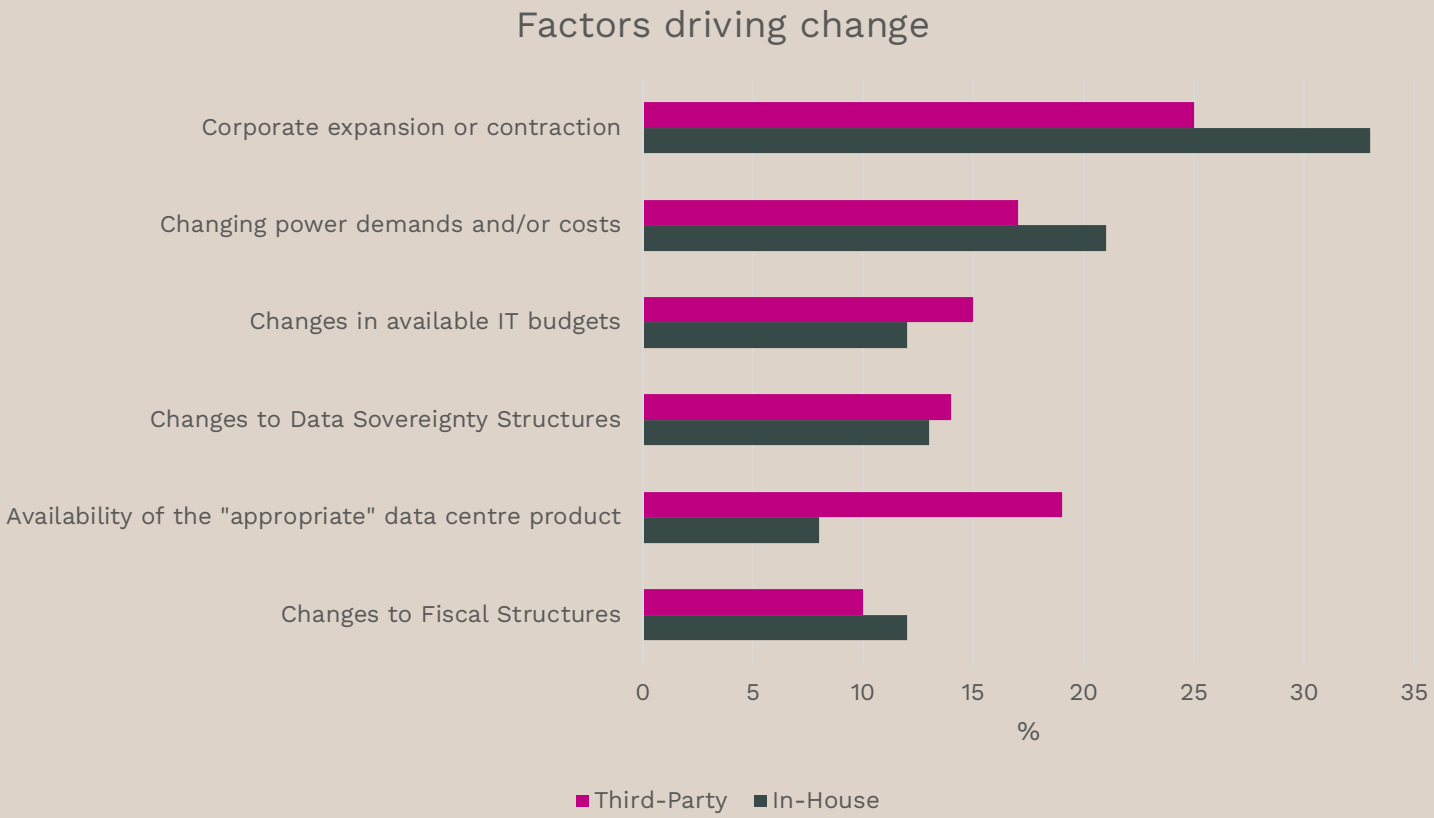
Additionally, some 61% of corporate participants said they expected to now downsize their in-house facilities during the period, up from 46% reported in the winter, with just over a quarter indicating that they would choose to retain floorspace at the same level, a fall from the third reported previously.

Respondents’ attitudes toward third-party managed space over the coming year also remains positive, and very similar to the expectations recorded in our winter 2023 survey. Some 68% of those surveyed indicated their intention to expand over that period, close to the 66% recorded in the preceding survey, whilst those reporting that they expect no change in their third-party estate remains around 24%. The number of respondents who are undecided remains in the low single-digit range of 7%, and finally the proportion of those who expect to downsize their externally managed facilities over the period remains unchanged at just 3%.

In our winter survey we noted an increase in the proportion of service providers who expressed intentions to expand their third-party managed infrastructure over the period, up to 68%. The latest period has now seen that proportion rise to around 76%. For end users we have seen the same metric remain stable over the two periods, with around four-fifths expressing their intention to expand their externally manged space.

Drivers of change

Since our survey work began a decade and a half ago, business expansion or contraction has consistently been identified as the most highly ranked factor driving changes in both internal and third-party controlled data centres. This sets out the clear message that companies have focussed on supporting business-generating IT infrastructure to improve and expand products and services to their internal users and customers. Our latest results show this remains unchanged with just over one-third citing it as the top priority.



As was the case last winter, changing power demands and the costs associated with it has remined firmly in second place; the number of respondents citing it as an important driver of change to both in-house and third-party operated space standing at 21% and 17% respectively. Budgetary issues are once again ranked in third place, albeit marginally with around 14% of respondents reporting it, a small decline from 17% reported six months ago.

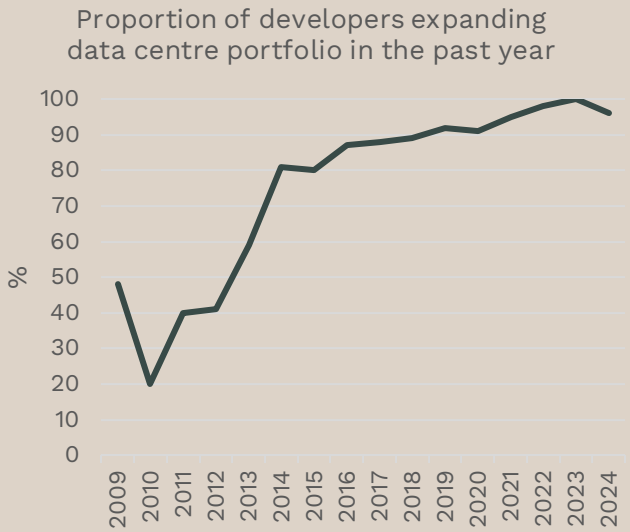
Changes in data sovereignty are ranked marginally behind power issues at around 14% - up from 10% last time around, suggesting this issue may be rising in importance for our respondents. In addition, fiscal structures remain relatively unchanged in our respondents table of importance, cited by 11%.

One factor in which there is a notable divergence amongst our respondents is that of the availability of appropriate data centre product. In our last survey we noted that there is significantly greater importance attached to this factor in regards of third-party data centres – some 19% contrasted to just 7% who cited it in respect of in-house solutions. This time around that differential is maintained with respective proportions remaining at 19% and 8%.

Developers and Investors

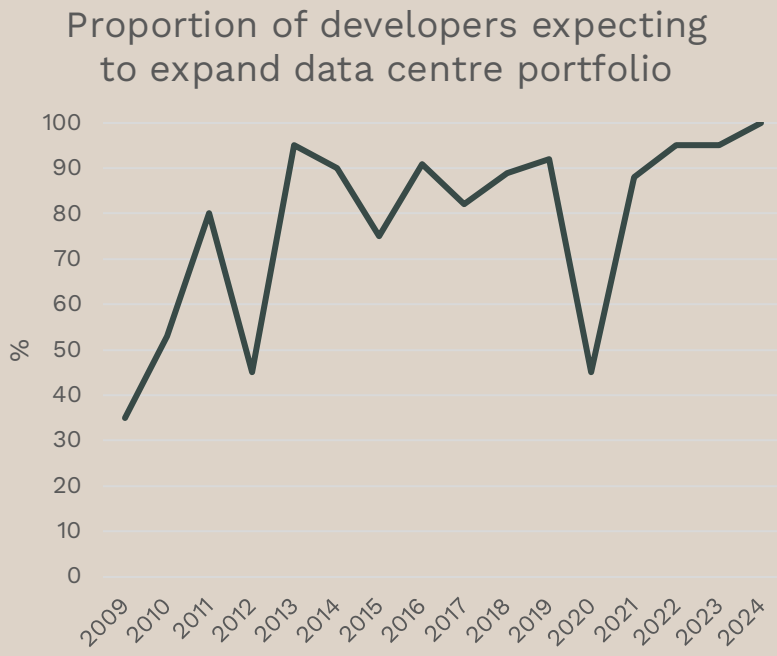
New supply plans continue apace

The balance in delivery of new build-out infrastructure to satisfy expected levels of demand is a fundamental element of the health of the European data centre industry. The propensity of those involved in the delivery of new space reflecting a desire to continue to invest is one of the key barometers to the ongoing health of the market. Whilst the industry continues to face challenges - for example shortages of skilled staff and supply chain restrictions - there remains a high level of positivity exhibited by our developer and investor respondents. For the fifth survey in a row, this group have recorded a near-universal expansion in their portfolio of technical real estate in the last six months – with some 96% stating that this was the case.

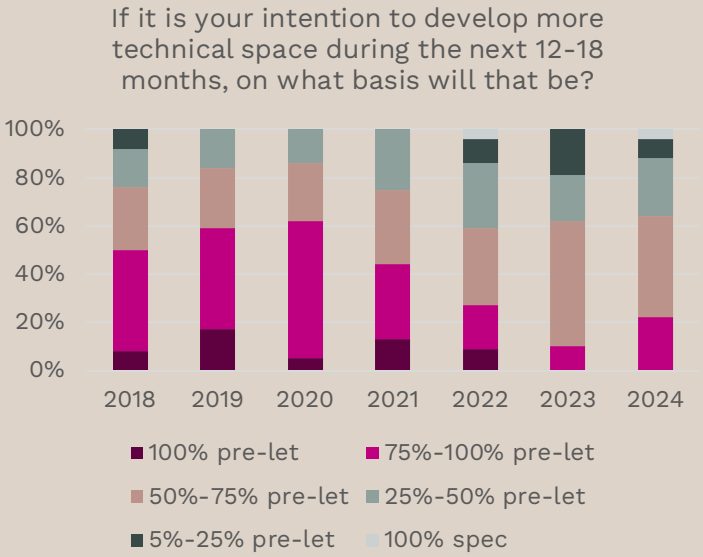


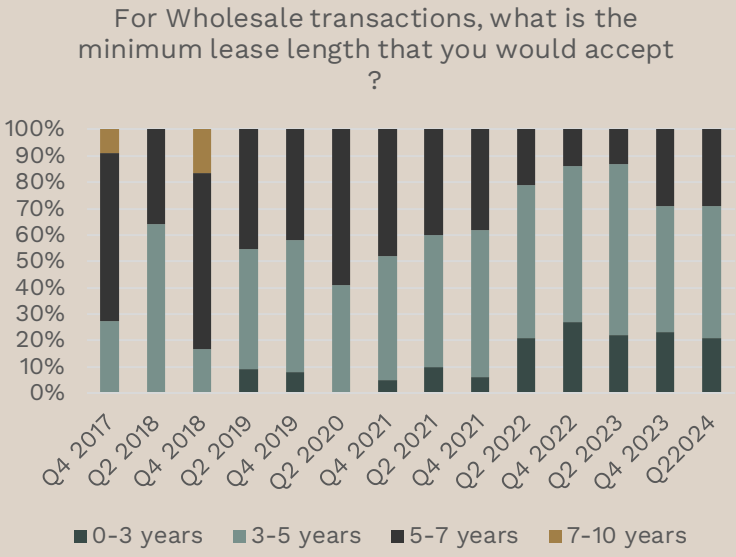
Further evidence that there is unlikely to be a slowdown in supply delivery soon is provided by the fact that all our developers and investors have reported that they intend on increasing their portfolio over the coming year, up from the 95% who did so in our winter survey.

We continue to assess the proportion of risk that developers feel able to support as a useful measure of their market confidence as well as that of their financiers. The degree of space they require to be pre-committed before starting a development scheme has proven to give a key indication of this. It should be noted that this indicator takes into account the phased build-out of larger data centres, where the amount of pre-let requirement is proportionate to that particular phase and not the entire site.



Whilst the level of reported optimism in the expansion plans of our data centre suppliers has been encouraging, there are signs to suggest that our developer and investor respondents have introduced a slightly higher degree of caution via their commercial pre-requisites. In our latest research, the number of respondents requiring at least 75% or more of their scheme to be pre-committed stood at some 22%, a significant rise on the 10% we recorded just six months ago and marks the first rise following a series of declines which we had noted in the three preceding surveys.





In addition to this, we also note a decline in the proportion of those who are prepared to start a build-out having secured a pre-lease on just 25% or less. This quantity has fallen from 19% six months ago and now stands at 12%. At least 24% of respondents reported that they required only a 25%-50% pre-let, a slight rise from 19%, whilst 42% would be happy with 50%-75% - a fall from 52%.

So an increased level of caution would appear to be emerging within the commercial terms for the new build out of space and potentially should not be viewed as a negative. Indeed, this approach to speculative development can be seen as reflecting a welcome self-administered caution that is likely to benefit the market as a whole, limiting the potential risk of general over-supply or development of schemes that may fall short of the key characteristics that make a successful scheme.

Another metric which we monitor to help gauge confidence levels amongst developers and investors is the minimum lease length for wholesale transactions that is required. Our latest survey indicates that these have been held at similar levels to our last survey; half of respondents suggested a three-to-five-year period would be required, (48% Q4 2023) whilst 29% would require lease-lengths in excess of five years (no change Q4 2023) and 21% (23% Q4 2023) would accept a period shorter than three years.

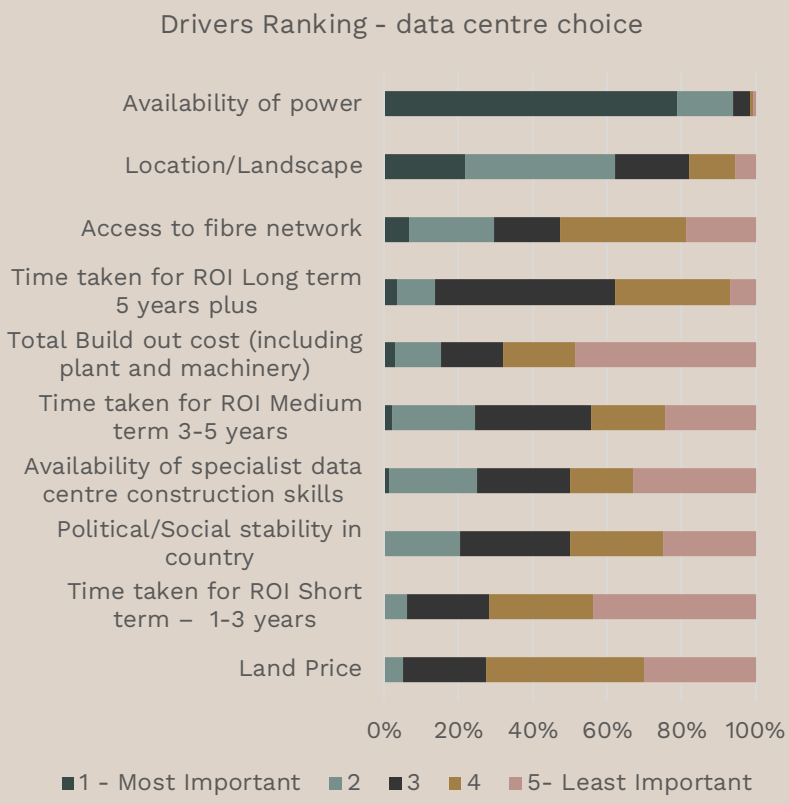
Ranking of choice factors for new data centre

Since we began our survey work 15 years ago, the availability of power has been ranked consistently as the single most important factor in the choice for a new data centre. The results of our latest analysis suggest that this firmly remains the case, with nearly four-fifths of respondents choosing Availability of Power as their top influencing factor. Indeed, the proportion of those ranking it in either of the top two positions remains at a high of 94%, in line with that recorded in winter 2023.

Location remains the second most highly rated factor with almost two-thirds of all respondents ranking it in either of the top two positions. Since the global pandemic, location has retained this degree of importance among our survey participants, and we would suggest this level is unlikely to diminish soon given the background of the continuing geo-political factors and the ongoing issues within supply chains and their effects on the location of company's data centres relative to the markets that they serve.

Over the course of 2021 – Q2 2023 we had noted that access to fibre was becoming an increasingly important factor for our respondents' when choosing a new data centre. In our last survey this trend fell away slightly, however we have seen a marked increase in acknowledgement that access to fibre has risen up in the consciousness of data centre builders when choosing sites. Now, some 32% rank it as one of their top two factors; a rise from the 22% reported previously.

Financial factors notably return of investment ranks reasonably highly with those seeking such a return over the longest term - five years plus being the most highly ranked and the shortest period one-to three years the lowest on this metric.



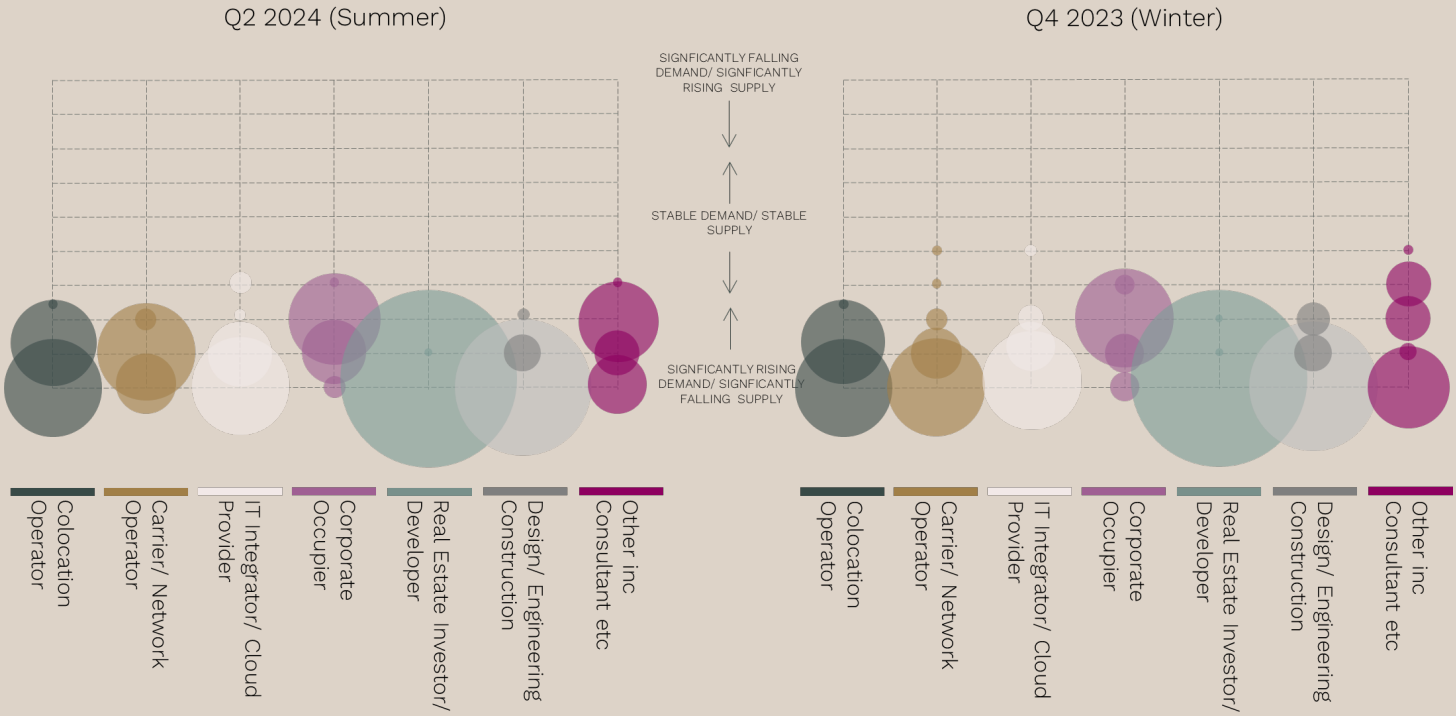
Whilst it is worth noting that political or social stability has become increasingly more important in recent surveys, it has dipped slightly in importance from previous surveys. Nevertheless some 20% rank it as one of their top two factors, not surprising given ongoing concerns about global political volatility and the Russian invasion of Ukraine and the Middle East Israel /Gaza conflict being two notable examples.

Factors such as the total build-out cost, availability of specialist data centre construction skills and land price were ranked highly by Developers and Design, Engineering, and Construction (DEC) businesses, but were consistently rated behind our top factors by the rest of our respondents.

Opinions

Skill shortages – an ongoing concern

An ongoing area of concern within the data centre industry is the lack of sufficiently qualified professionals to meet demand, particularly across the design, build and operations disciplines. Our research during the past eight years has tracked this area closely and sought to gauge market practitioners concerns and the resulting effects on delivery of space to the market.



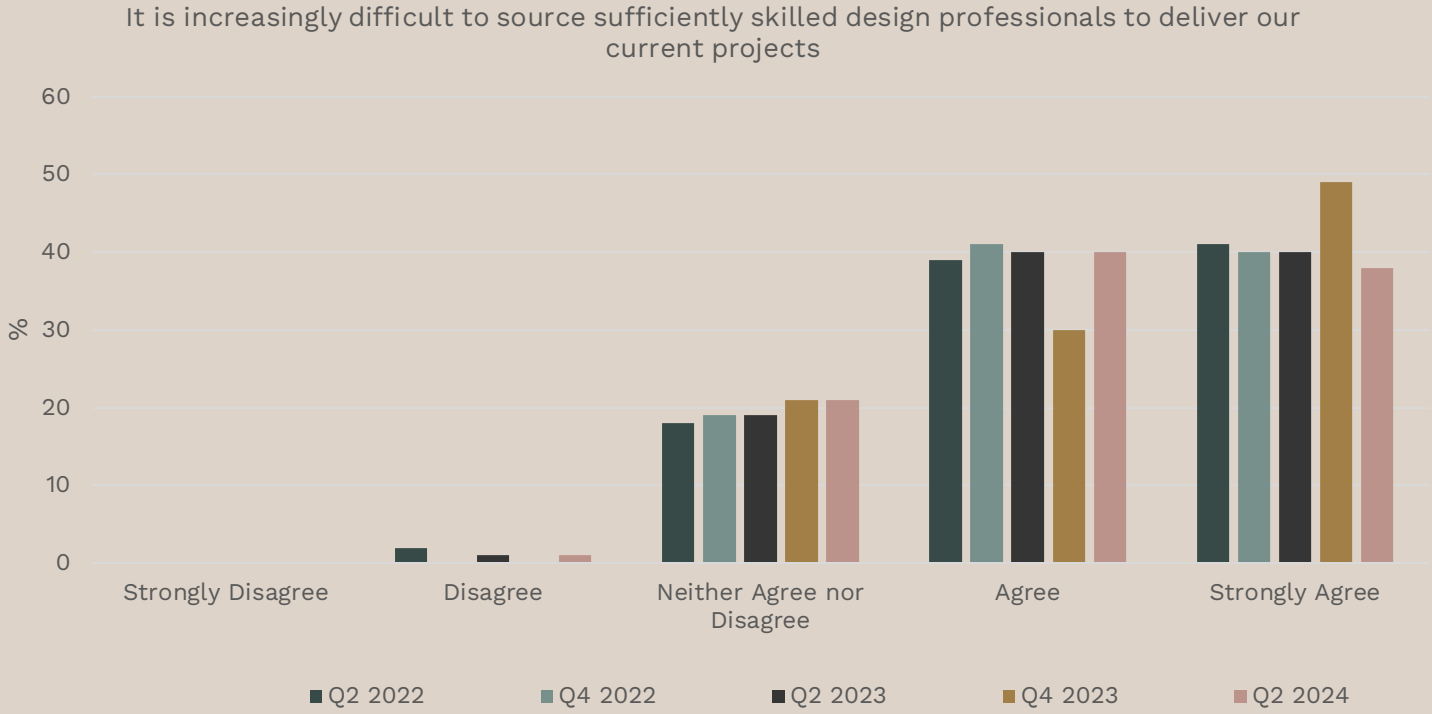
- Our respondents continue to report that shortages of skilled labour across the data centre industry are pronounced. Our previous survey reported that some 98% believed that 2024 will see a decline in supply of staff, and this proportion has now reached 100% believing there will be a dearth of skilled labour felt in the next 12 months.
- Some 97% also believe that this will be accompanied by a rise in demand for staff with these skill sets, up from 93% since our last survey.
- Amongst our developer and investor practitioners the level of concern is most pronounced with universal agreement that the coming year will be characterised by the double issue of significantly falling supply of staff whilst demand for those skill sets rises – up from the 96% reporting the same six months ago.
- Although the majority of colocation providers carriers/network operators and IT integrator believe the coming year will be characterised by falling supply and rising demand of qualified professionals, the level of concern amongst this sector appears to have eased slightly falling from 53% reported six months ago to 48% most recently.
- Amongst our end user respondents, we see growing concern with some 95% believing that a rising demand of skilled staff would be met with falling supply, an uplift from the 90% recorded last winter.

Who's in short supply?

The level of concern expressed by our respondents regarding shortages of suitably qualified design professionals is showing little respite in our latest survey. Nearly four-fifths of survey participants expressed their agreement that sourcing such labour was becoming increasingly difficult, a proportion which has remained largely unchanged over the last five years.

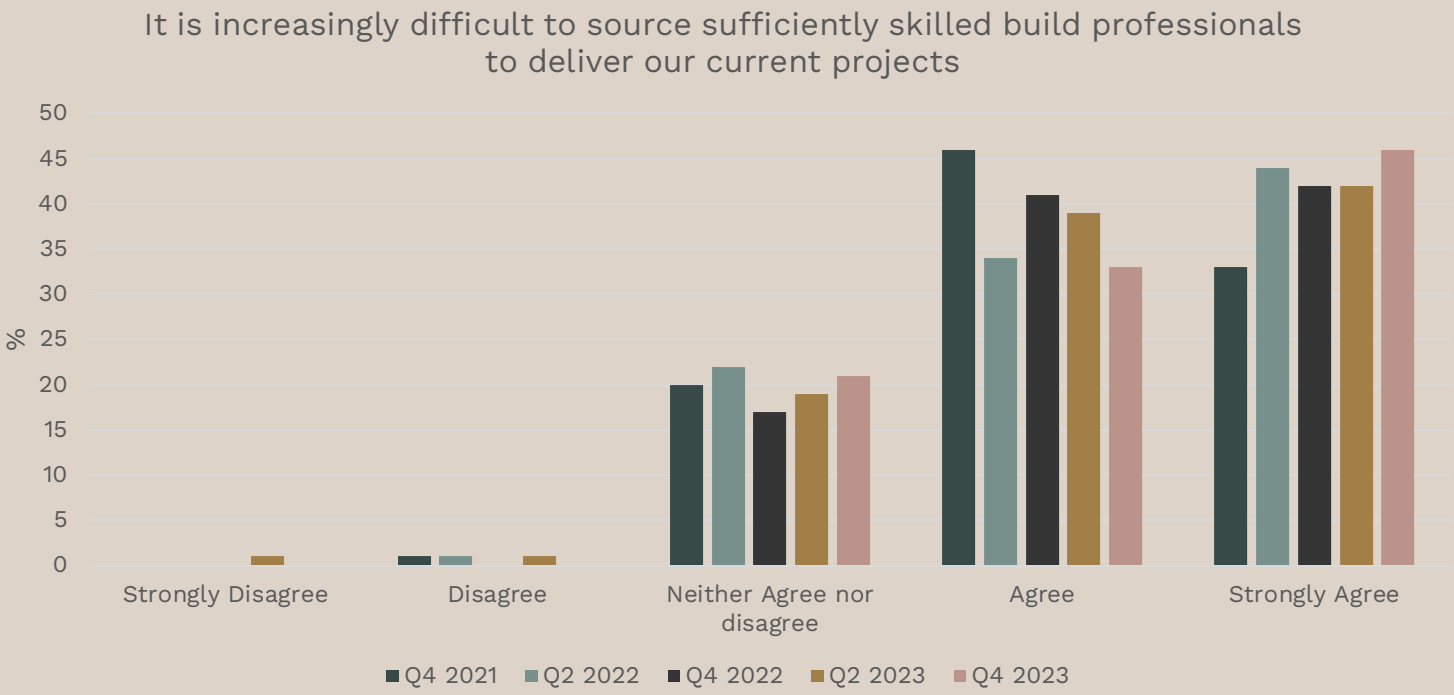
Interestingly for the second successive survey we have noted a marginal decline in the level of concern expressed regarding the build sector. Some 73% indicated their concerns that a shortage of sufficiently skilled build contractors existed - down from the 79% we reported six months ago, and the 81% proportion seen a year ago.

On the operational side, just over 70% of respondents stated that they have had direct experience of shortages of operations staff over the last year. As with build professionals this represents a small fall on the 76% who reported the same metric six months ago.

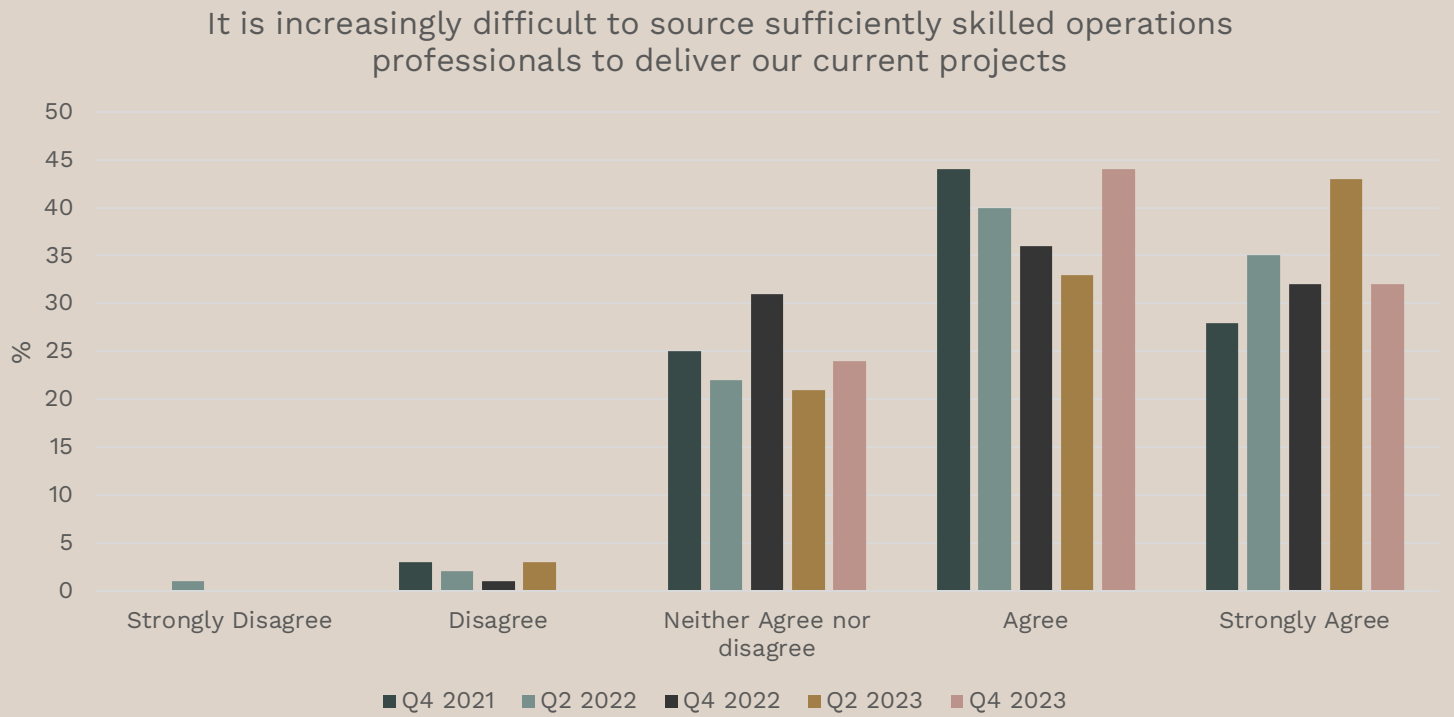


As expected, there are several differences between respondent groups. For example, the highest level of concern for shortages amongst design and build personnel come from our respondents who are directly involved in the building process, with all respondents involved in design/engineering or construction side as well as all our developer respondents stating they believed there was a shortage of such personnel. In addition, some 85% of service providers shared this viewpoint regarding shortages of design professionals and 77% of this group believed there was a paucity of sufficiently qualified build staff.

Regarding shortages of qualified staff on the operational side the highest degree of corroboration comes from our corporate sector – around three-quarters expressed their agreement, albeit this represents a fall on the 85% recorded six months ago. In addition, our service providers have become slightly less concerned in this area with some 83% expressing their belief that shortages of such staff are more prevalent contrasted to the 88% noting the same in Q4 2023.



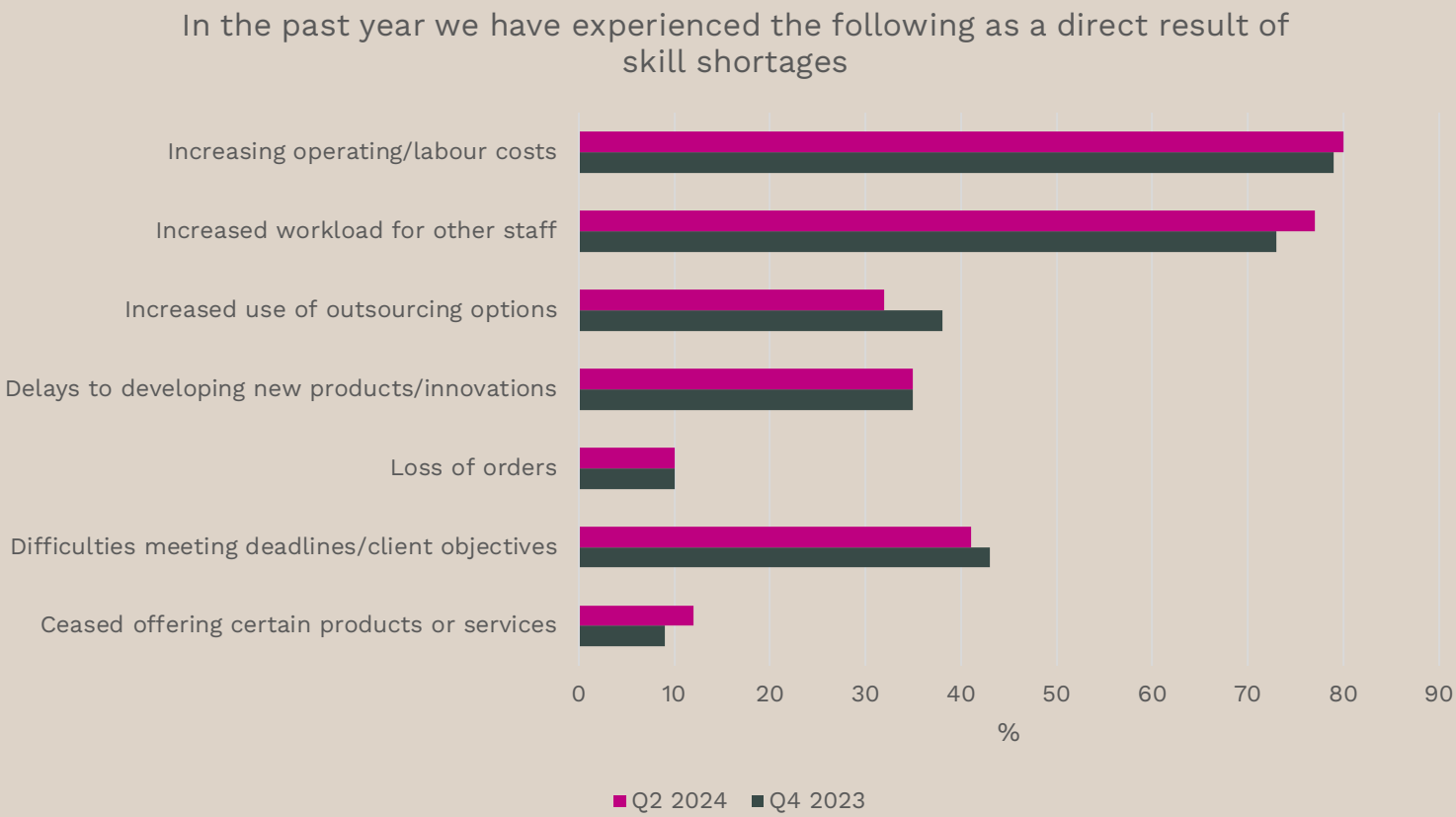
As we noted in our summer survey, for service providers the strength of belief in design and build skill shortages remains less pronounced than for DEC and developer stakeholders, although still high with 83% agreeing that shortages are problematic. Amongst these respondents, shortages of skilled operational staff are more problematic – some 89% share this belief. Similarly, amongst end users, the availability of operational staff remains the area of biggest concern with 85% agreeing, albeit this represents a decline on the 94% we recorded six months ago.



Impact of skill shortages

The levels of agreement amongst respondents reporting concerns around skills shortages suggest that these fears are well founded and that it is an area of potential threat to future supply of new data centre stock. Over the past four years our surveys have provided evidence that these skill shortages have had a real impact on businesses in a number of ways. The two largest impacts of skill shortages cited by our respondents have been increasing operating and labour costs and increased workload for other staff: both potentially placing inflationary pressures on end user costs. In Q4 2023, these two were the most cited results by our respondents at 79% and 73% respectively, whilst in our latest survey these remain alarmingly high at 80% and 79%.

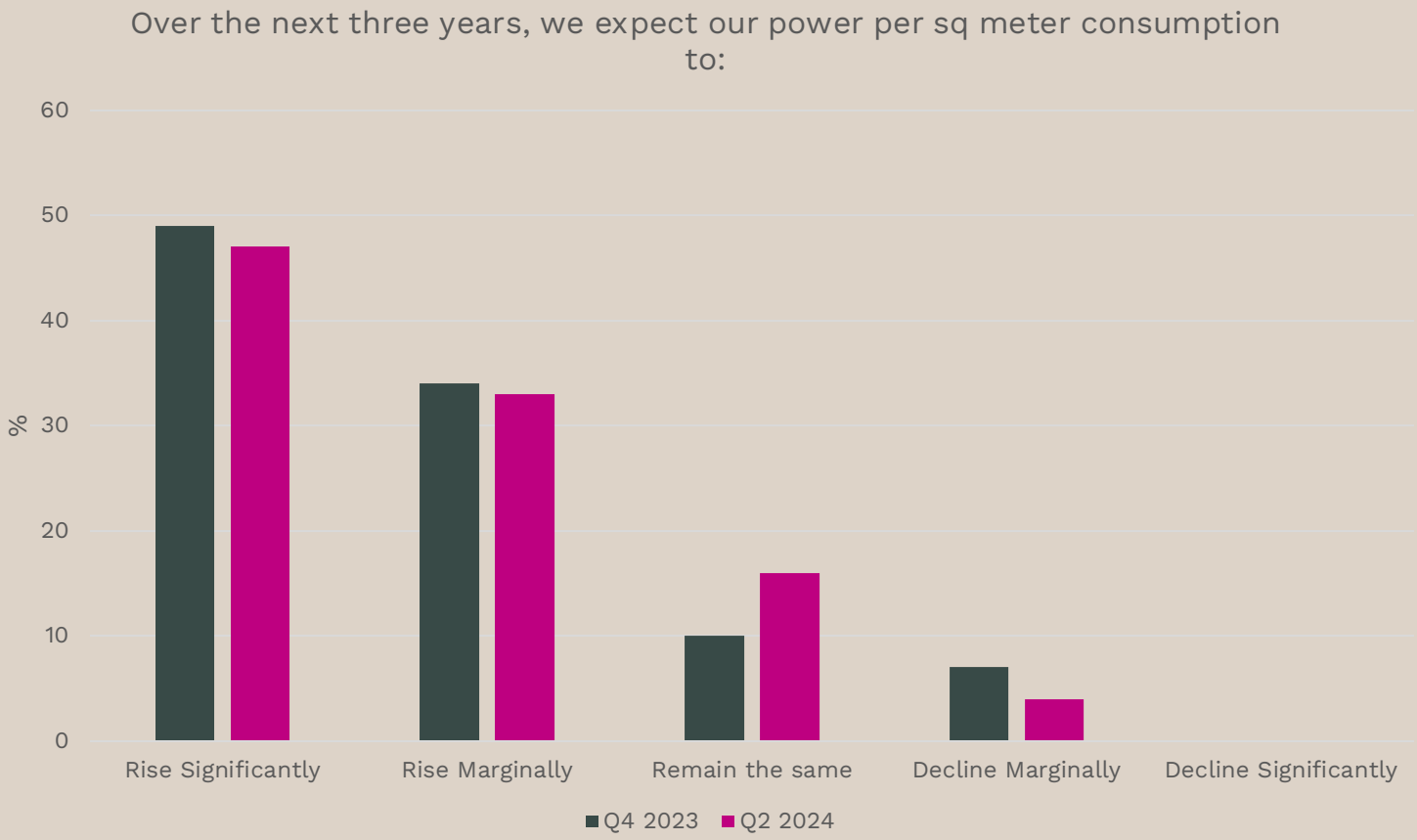
Greater workloads for existing staff have in turn led to problems in resourcing existing work, with around two-thirds of respondents stating that they had experienced difficulties in meeting deadlines or client objectives, a proportion which has risen from 43% over the past six months. The more extreme consequence of this has led to lost orders – around one-in-ten believe that they have directly lost orders, unchanged since winter 2023. Indeed, the dearth in skilled professionals appears to have contributed to the growing popularity of outsourcing options, with approximately one-third of respondents showing acknowledgment.



In addition, some 35% stated that shortages had led to delays in developing new products/innovations. This is unchanged on the total who reported the same some six months ago, whilst the proportion that noted they had ceased offering certain products or services has risen from 9% to 12%.

Power

Consumption on the rise



Arguably the biggest challenge facing the data centre industry globally is the sourcing of enough power to support the demand for its services, driven by the growth of digital transformation, automation, IoT and of course now AI. Increasingly this power must not only be affordable but also from renewable sources as the current social and political environment demands. Indeed, earlier this year, the International Energy Agency (IEA) reported that data centres consumed 460TWh in 2022, a figure that they suggested could rise to more than 1,000TWh by 2026.

Around four-fifths of our surveyed professionals expect their levels of consumption to rise over the next three years, albeit a proportion marginally below the 83% recorded in Q4 2023, but importantly almost half of these expect this rise to be significant. A further 16% predict that their levels of consumption will plateau over the period, and just 4% are expecting to see a reduction – a fall on the 7% reported six months ago.

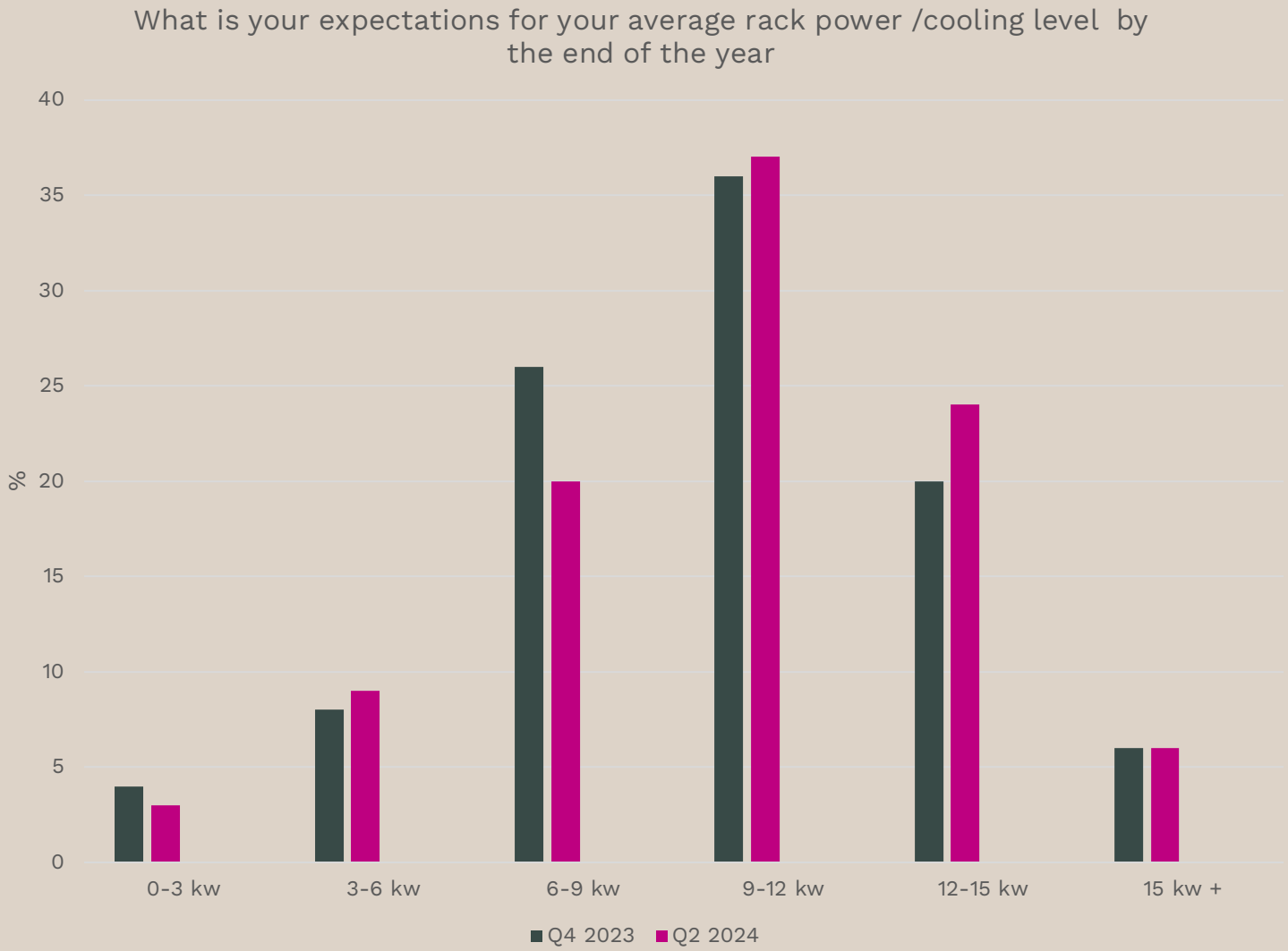
There is a marked difference within professional sectors is terms of the degree of uplift expected. As we have seen previously, almost all our developer respondents expect to see an increase in power usage with around 90% of these expecting this rise to be significant. Amongst our services providers a similar profile exists, with nine-out-of-ten colocation operator respondents expect to see a rise in their power usage and just over two-thirds of end users agree.

Average Rack Power/cooling levels on the rise

Around 37% of respondents expect to see an average rack power/cooling level of 9kw-12kw over the coming 12 months, in line with on the level reported this in winter 2023, and the third successive survey that we have noted the most respondents anticipating average rack power/cooling level in this range.

In addition, we have seen a jump in respondents who expect to see an average rack power/cooling level in the higher band of 12kw-15kw over the course of the coming 12 months; some 24%, up from the 20% seen in our last survey. Also, once again only a small proportion of our respondents – around 6% - reported that they would see a level higher than 15 kw per rack.

Amongst our corporate respondents, around a third are expecting to see average rack power/cooling level of 9kw-12kw over the next year whilst a further 28% suggest their average levels will be in the 6kw-9kw range.

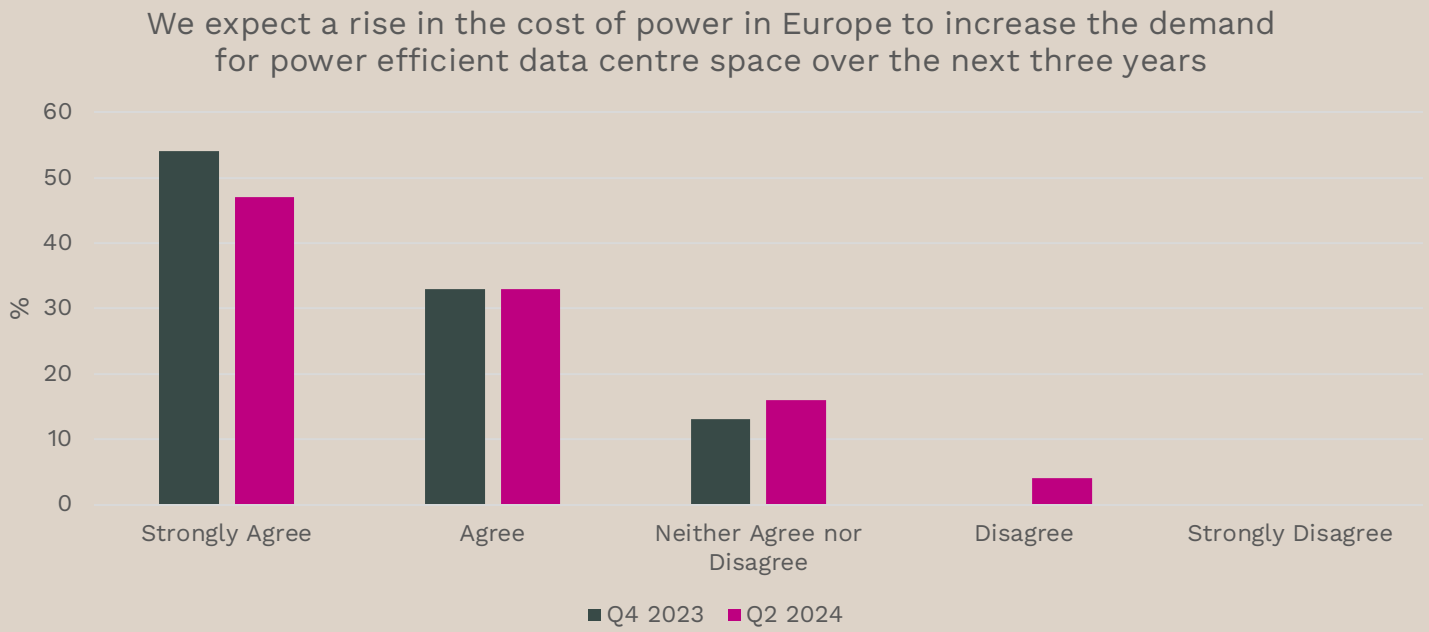


Rising power cost to drive efficiencies

Two years after the Russian invasion of Ukraine and the resulting economic sanctions which led power inflation to soar, recent signs suggest that wholesale electricity prices may be retreating to levels more familiar to pre-war levels. Whilst global energy markets have undoubtedly worked hard to counter the unsettling period, the impact of rises in costs is likely to have longer term legacy for the European data centre market.

With the rise in electricity costs, undoubtedly owners and operators have sought avenues to gain efficiencies within data centres to try and limit the damage of rising power costs. Indeed, last winter some 87% of our respondents indicated that they believe this rise in the cost of power will increase the demand for power efficient data centre space over the next three years, and this proportion remains in our latest research.

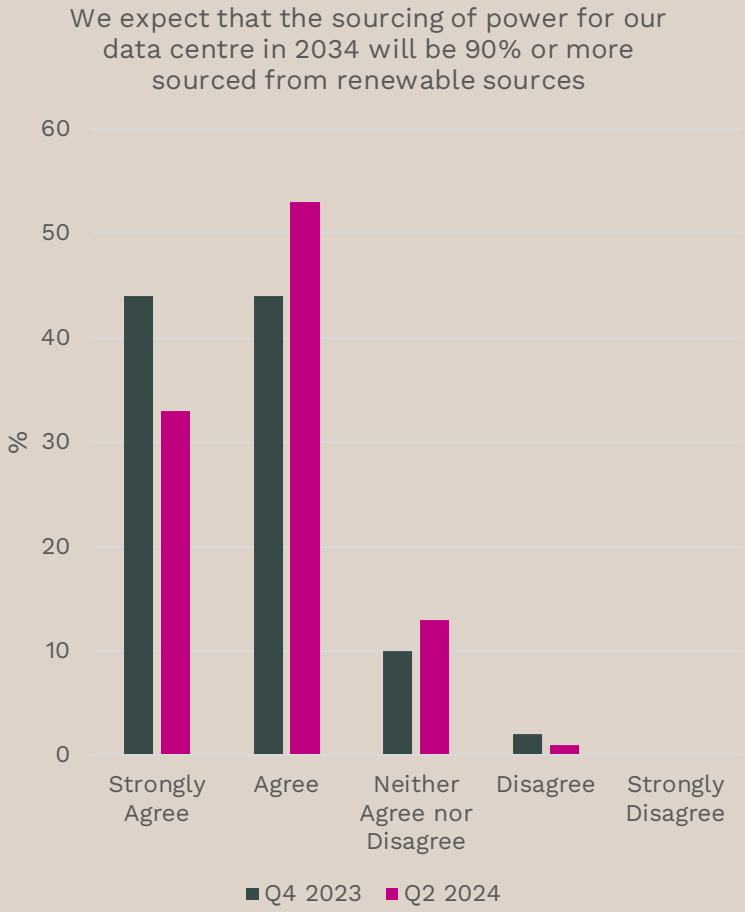
Once again, our service providers were the most resolute on this; some 93% expressed their agreement with this outcome, albeit a marginal fall on the 97% reporting the same last winter. However, this time 68% of end users agreed, which is a significant rise from the 45% recorded just six months ago.



Move to renewables

There is no doubt that the current political and social agenda around power provision is firmly focused around Net Zero and sustainability. Amongst our respondents there is clear evidence that the commitment to a move to source energy from renewable forms is strong.

Over the course of the next decade 86% of our respondents expect to see at least 90% of their data centre energy usage to be sourced from renewable generation. This remains at the heights we recorded in our last survey and with just 1% disagreeing with the statement provides clear evidence that the industry is playing its role in the global quest for a responsible and sustainable energy future.

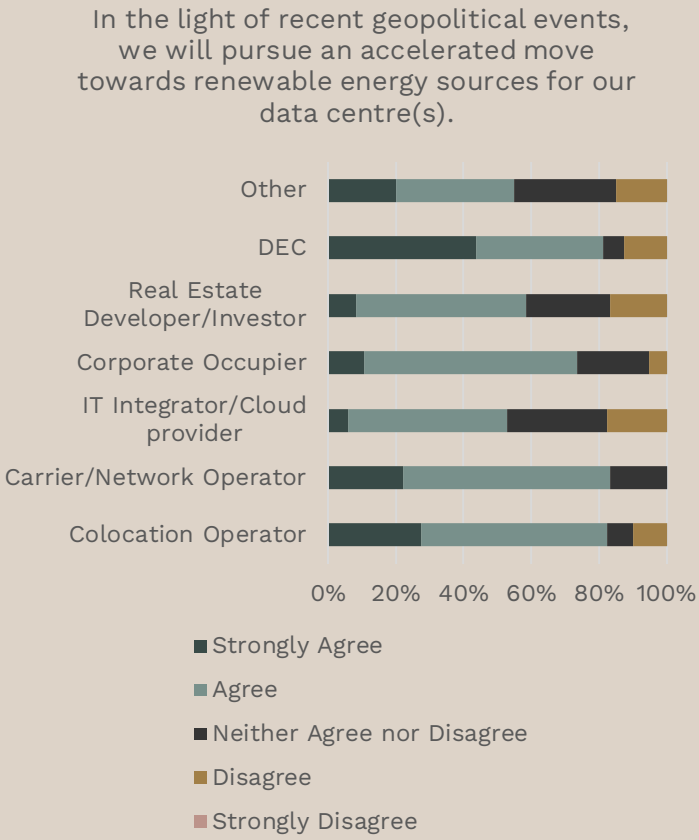


Although this 11% of those who disagreed is a rise on the 6% previously monitored, it may well be that this is not due to a fundamental disagreement with the overall statement, but in fact more likely that these respondents have already chosen to pursue a move towards renewable energy sources or indeed achieved it and thus have no need to accelerate the process.

Amongst end users, 74% agreed that recent events would prompt them to expedite their transition towards renewable energy, a fall from the 85% reported six months ago, whilst in contrast we saw a rise from 64% to 76% of our service providers who shared this belief. For developers and investors, the level of agreement is slightly lower at 58% a decline on the near two-thirds, who expressed this preference in Q4 2023.

Once again, our developer and investor respondents were near universal in their agreement on this issue – this represents the fifth successive survey we have recorded this degree of commitment. Amongst our service providers the proportion sits at 87%, a slight decrease on the 92% reported previously, whilst 90% of our corporate participants agree.

Ongoing geo-political difficulties and their subsequent impact on energy supply chains, help to underscore the benefits of a move towards locally generated renewable energy sources with the likelihood that they will prove less susceptible to global disruption as well as minimising the effects on the environment. For the second successive survey some 71% of survey participants agreed that recent events would prompt them to expedite their transition towards renewable energy, whilst 18% adopted a neutral position and 11% disagreed.



Supply chain disruption still problematic

Whilst difficulties with global supply chains gained much publicity during and immediately post the Covid pandemic, our latest survey provides evidence that the data centre industry continues to be impacted by the timely availability of key resources. This disruption has undoubtedly been exacerbated by the war in Ukraine and most recently by the Middle Eastern conflict which has seen disruption to Gulf shipping routes.

The evidence that such activity is still impacting the industry is provided by 87% of our respondents who stated that they had experienced supply chain volatility in the past year, a similar proportion to that recorded in the final quarter of 2023.

Once again, our professionals involved with delivering new data centre stock to the market appear to report the most impact, with all our developer/investor respondents as well as our DEC (design engineering and construction) professionals agreeing. This is the second survey that such levels of universal agreement have been recorded. Amongst our service providers, there is still a high level of agreement regarding this disruption with 97% recording that they had experienced such supply chain problems, the same levels recorded six months ago.

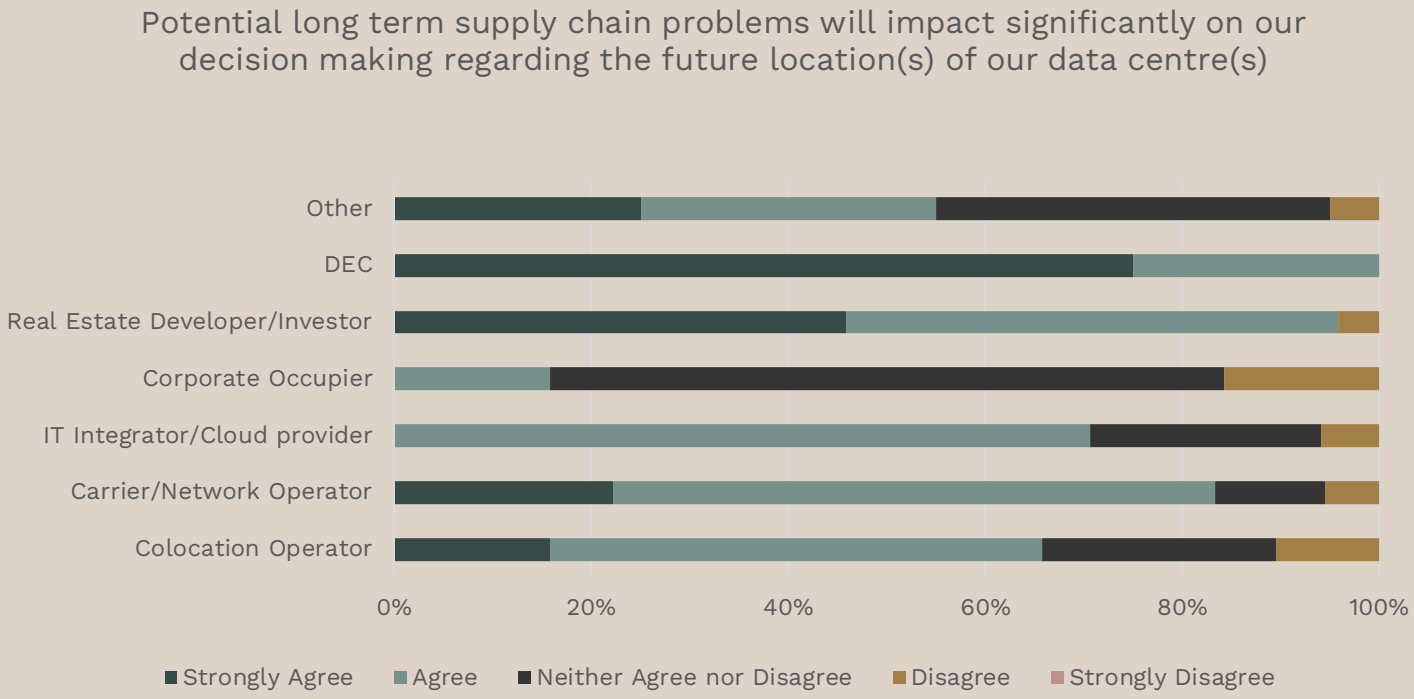
Supply chain disruption impacting future data centre locations

We have long reported the importance of location for our respondents when choosing a new data centre. Indeed, the latest data illustrates its ranking second only to the availability of power in a listing of contributory drivers. Our latest findings suggest that our survey participants appear increasingly concerned that continuing supply chain disruption will have a real impact in their decision making regarding future data centre locations. Some 69% state that supply chain disruption could heavily influence their choice for future locations for new facilities, an uplift on the 64% reported six months ago.

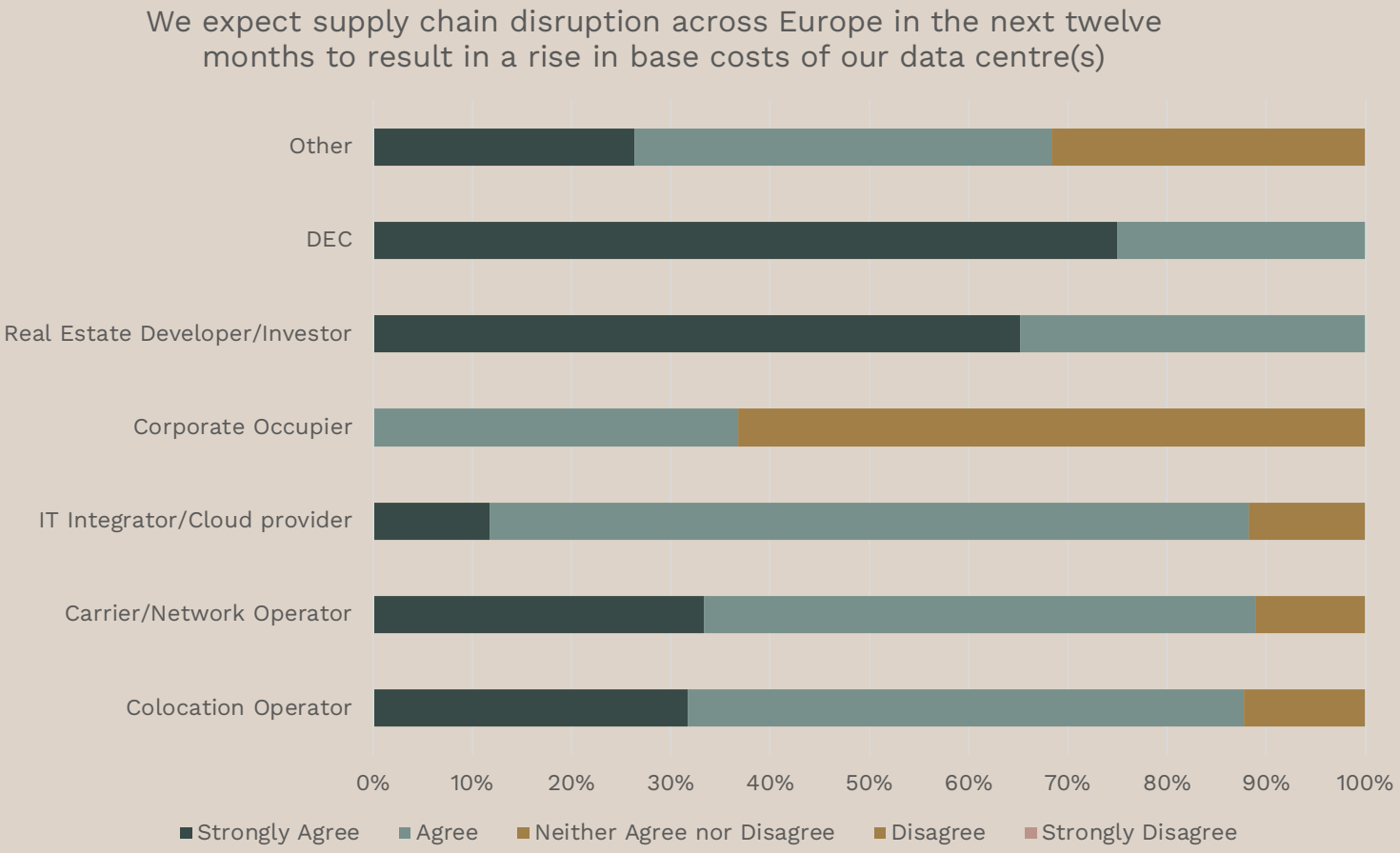
There are differences amongst our survey groupings. Once again, our DEC participants were the most vehement in agreement with universal adherence, up from 93% six months ago, and of these 75% did so in the strongest possible terms. In addition, many of our service providers remain concerned on this issue with 71% reporting their agreement, albeit a small fall on 73% reported last winer.

In contrast, for the fifth survey in a row corporate respondents expressed the lowest level of agreement, with just 16% agreeing that supply chain factors will heavily influence their future locations for new facilities and this group also recorded the highest levels of disagreement with the statement amongst our groups ay 16%, this reflects a downturn on the 35% recorded in the summer. This group does record the highest level of change amongst our professional sectors with around two-thirds now choosing to adopt a neutral view on the issue, almost double that reported six months ago.

To some extent this may reflect that the group is shielded from supply chain issues given its increased preference for third-party manged infrastructure solutions, although this rise over a relatively short period is worth noting and will be monitored moving forward.



Inflationary impact – still an issue



As we noted earlier in the report, the inflationary spike in energy prices which occurred in the wake of the Russian invasion of Ukraine is now easing across most of Europe. Nevertheless, there is no doubt that the data centre market has had to continue to deal with the inflationary impact that has been caused, particularly because of the forward purchasing nature of power contracts that means price rises can be baked into commercial terms even though wholesale pricing pressures have much reduced.

So how have our respondents dealt with the cost inflation? The latest survey suggests that some 82% of respondents have chosen to pass these costs on to their clients, amongst our service providers this proportion rises to some 91%.

Moving forward, evidence suggests that our respondents also expect to see future rises in their data centre costs over the coming year because of further supply chain disruption. Indeed some 83% of our survey participants suggest that this is likely to be the case. Once again amongst our developer and DEC respondents there is almost complete agreement that this will be the case. In addition, many of our service providers remain concerned on this issue with 81% expressing their agreement.

The Impact of AI

Whilst Artificial Intelligence is not new, there has been a significant momentum change around the subject – particularly generative AI - within the public consciousness since the launch of Chat GPT at the end of 2022. Indeed, according to global management firm McKinsey's latest report "The state of AI in early 2024" this is the year that organizations truly began using - and deriving business value from - this technology. And they back this up with evidence from their survey: 65% of respondents report that their organizations are regularly using generative AI, nearly double the percentage from their 2023 survey, and general AI adoption amongst organizations has jumped to 72% having remained static at around 50% for the previous 6 years.

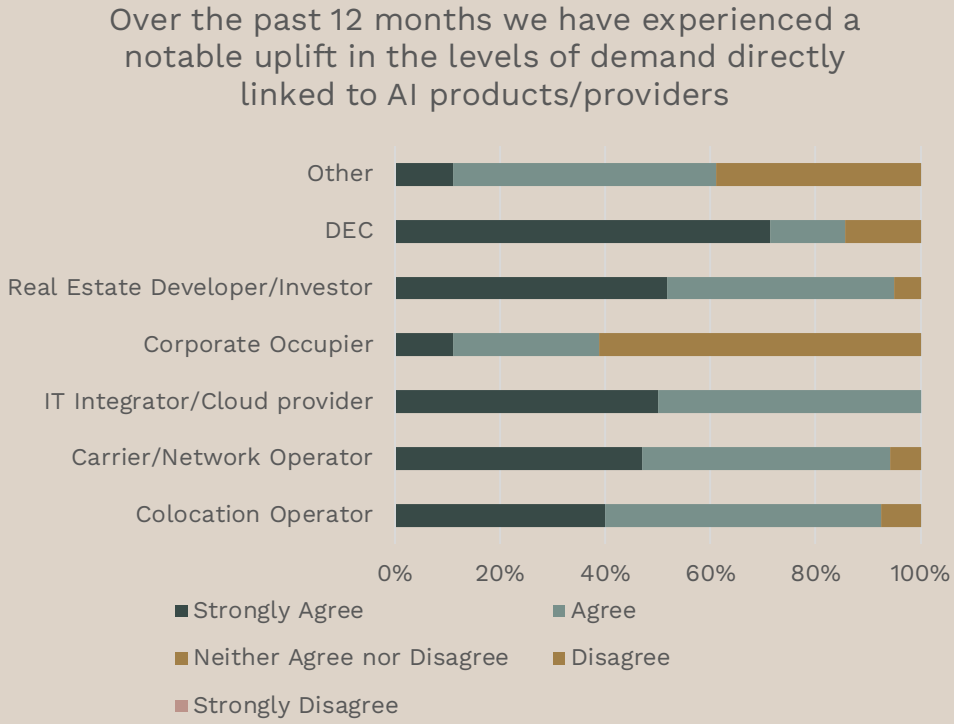
The growth across AI has the potential to drive economic growth and productivity, reshaping jobs, and transfiguring wider human cultural, artistic, musical and media landscapes. Whilst change brings opportunities, commentators are also recognizing the risks associated with the technology, including concerns around data privacy, bias, intellectual property infringement, inaccuracy, incorrect use and of course, security. However, with growth estimates of around 26% CAGR from 2022 – 2032 (Spherical Insights) which could see the Europe AI market size reach over €300 billion, the sector is guaranteed to play a significant role in shaping our societal and economic future.

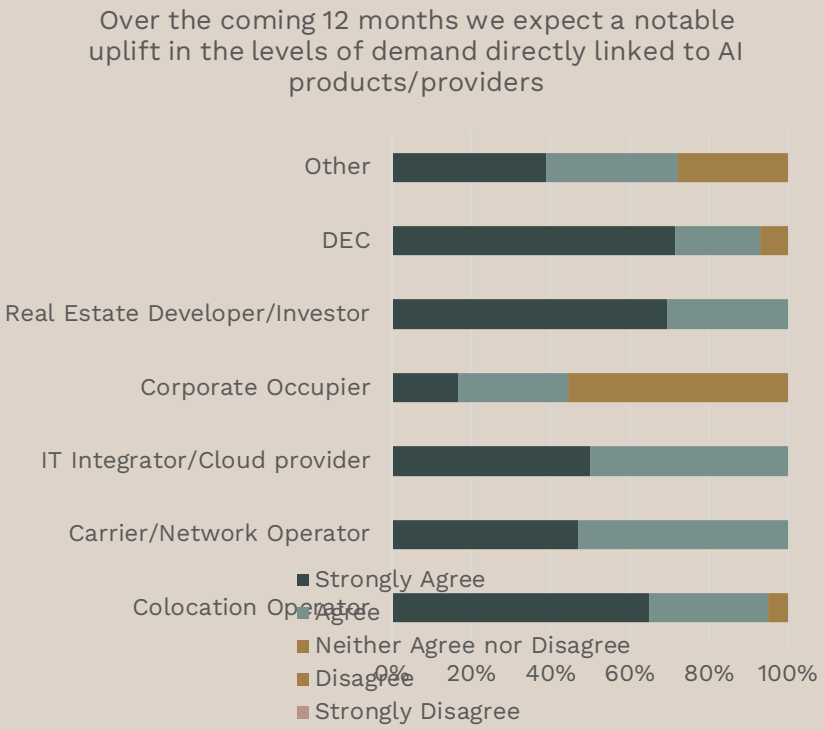
For the data centre industry there are broadly two key areas of influence from AI. First is demand. AI can't exist without data centres, and the technology creates a substantial amount of computational power and storage even by recent standards. For example, whilst estimates vary widely, a ChatGPT search can reportedly consume up to 25 times more power than a typical Google search, and the server cooling needed for a single, yet typical 20-50 query conversation with ChatGPT results in the evaporation of up to half a litre of water. And this is just one company (albeit perhaps the best known) with estimates that there are over 55,000 AI companies worldwide and growing quickly, driven by a wall of investment looking for the next technology goliath. Indeed, Consulting firm Gartner predict that at this rate, AI could account for up to 3.5% of global electricity demand by 2030, nearly doubling the current estimated 2% consumed by the entire data centre industry.

Second is use. Predictive analytics is a core area of AI spotting patterns in datasets and applying learning to future tasks, automating and streamlining operations. Data centres are adopting AI to benefit from these greater efficiencies, cost savings, driving improvements in services. Even using AI to try and improve energy efficiency and cooling to counter the effects of the growth of power and cooling that is driven by the wider AI demand proliferation. One key consideration is whether the drive of AI in data centre design and operations could provide a solution for lack of skilled manpower in these sectors, or exacerbate the problem as the skills needed for these jobs require more of a technologically educated focus?

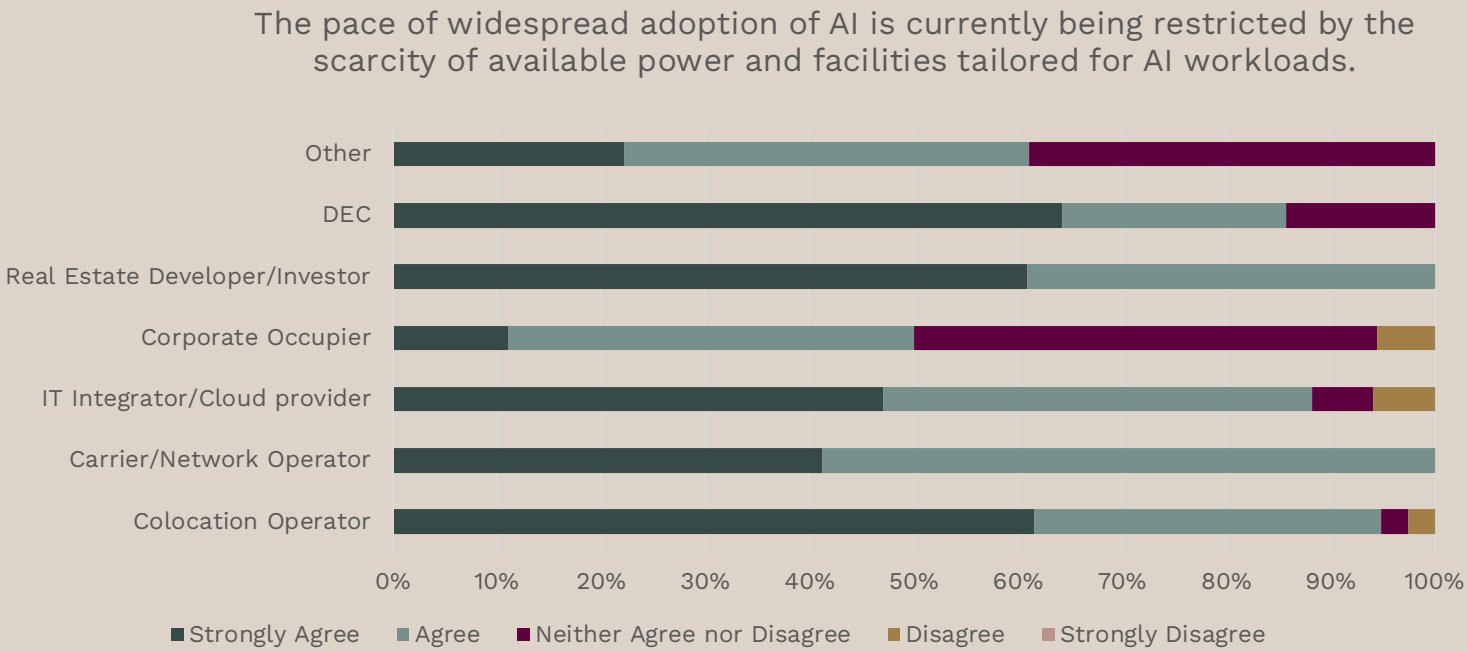
Demand growing

Over four-fifths of our respondents have reported experiencing an uplift in demand as a direct result of AI over the past year, and amongst our integrators and cloud providers this jumps to universal agreement, whilst amongst developers, investors and service providers this proportion sits at around 95%. It is only amongst end-users where there are significant differences – just 40% agree whilst the balance and 60% adopt a neutral position.





Moving forward, indications are that demand will continue to be driven by AI growth. Some 87% of our respondents believe that the next year will see a notable uplift in demand directly linked to AI products/providers. Amongst our service providers this proportion jumps to 97%. Once again, all integrators and cloud providers believe this to be the case as do all our carrier/network operator respondents. In addition, there is universal acknowledgement of this amongst developers and investors. Notably, only 45% of our corporate respondents indicated they thought this rise will occur, whilst the remainder adopted a neutral position.



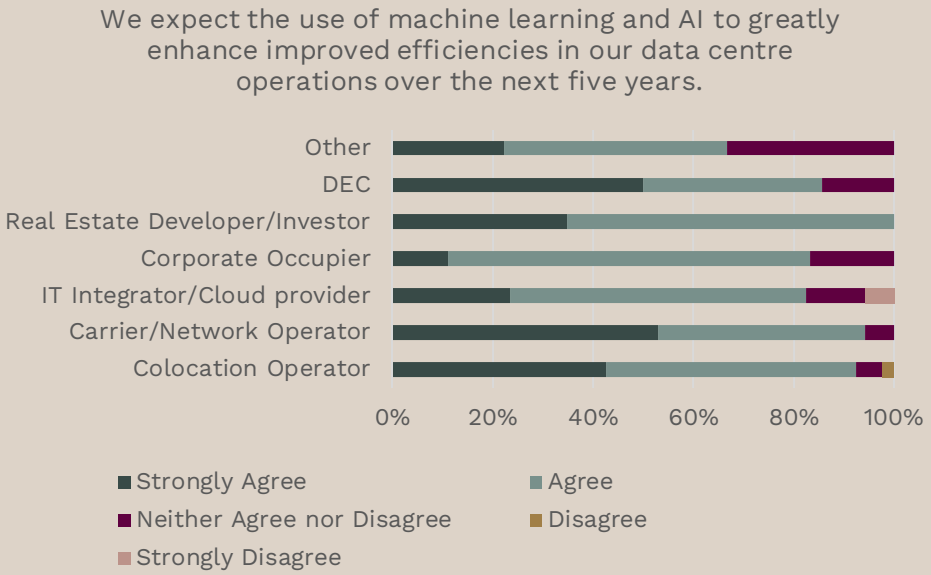
There is concern that the pace of AI adoption may be restricted by the ability of the market to deliver sufficient supply to house it. We have already noted the increased demand for power and cooling densities that AI requires. These facilities need infrastructure to house the high-performance servers, storage systems, networking infrastructure and specialised hardware accelerators, which allow them to cope with vast amounts of data processing applications at scale.

Amongst our respondents some 85% believe that the pace of widespread adoption of AI is currently being restricted by the lack of available power and facilities tailored for AI workloads. Again, amongst our service providers, this proportion jumps to some 95% and indeed all of our carriers/network operators share this view – a dynamic also reflected by our developer and investor survey participants.

Data centre AI use

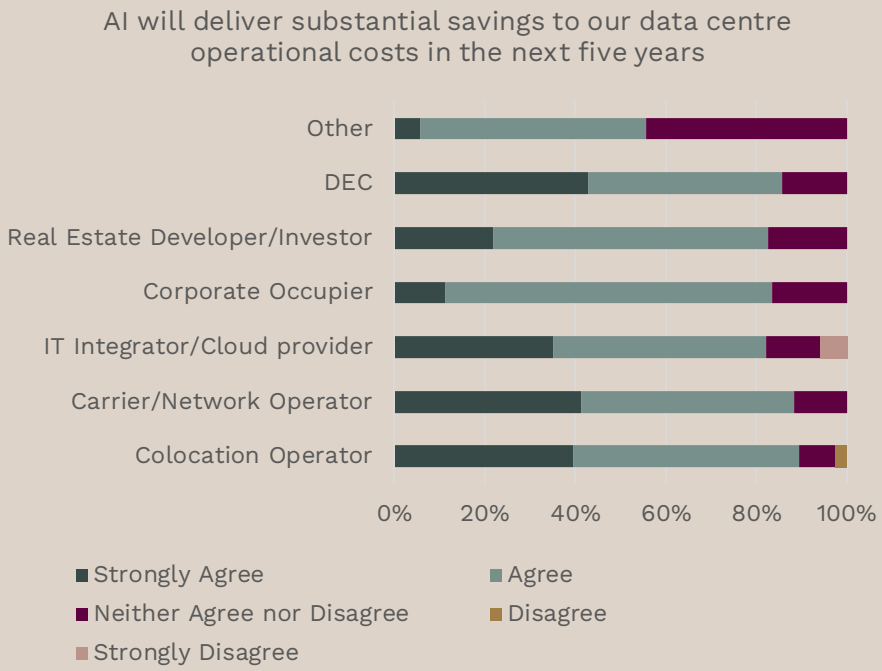
One of the fundamental AI tools is the use of predictive analytics. In practical terms operators can use these tools to make improvements in areas such as cooling or help to reduce inefficiencies in IT infrastructure and helping operators to finesse power allocation and rack space. All with the aim of minimising operational costs and improved power usage effectiveness.

In addition, there are a multitude of other applications that AI can be used for, such as improving workload management using hardware and network services more efficiently, aiding business continuity by utilising predictive maintenance and lowering hardware replacement costs. In addition, AI tools can also be used to enhance security across data centres by encouraging defence mechanisms that are faster to learn about enhanced threats and thus are able to respond better, spotting unusual patterns of activity before real problems arise.



The expected impact of AI on the operational side for data centres is expected to be very positive. Around 90% of our respondents expect their data centres to be more efficient as a direct result of AI applications. Amongst our service providers this proportion rises to 94% whilst all our developer respondents believe that to be the case. This proportion falls to just over 80% amongst our corporate survey participants.

The greater efficiencies that AI is expected to deliver for data centres will in turn lead to savings on operational costs of these facilities. Overall, around 82% of our respondents expect this to be the case. Interestingly amongst our service providers this portion is slightly down at some 77% whilst 83% of our end users agree.

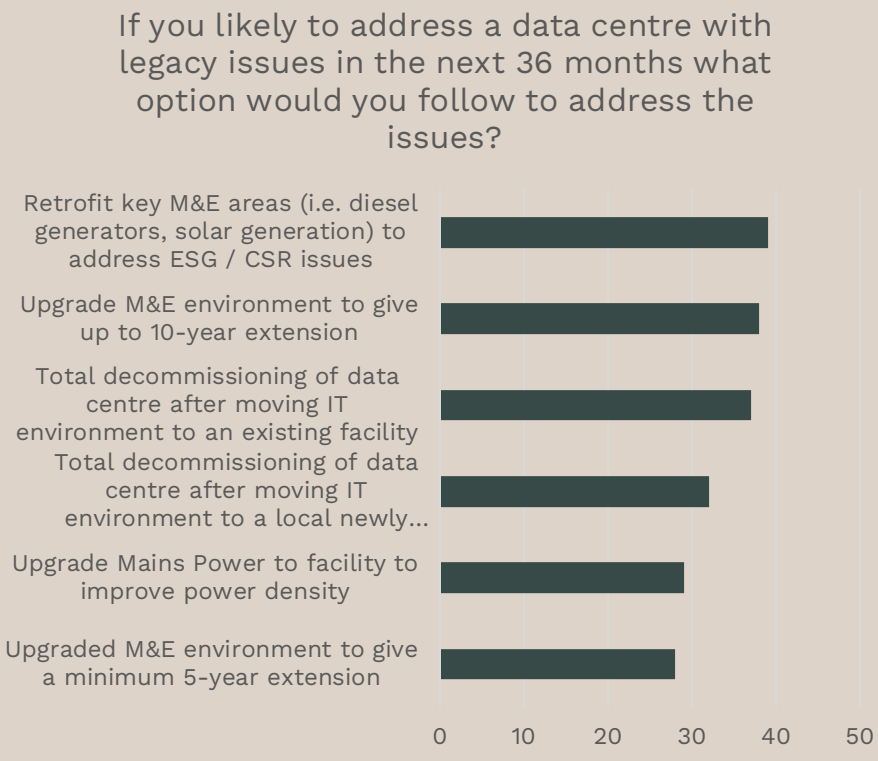


We have already noted the level of concern amongst our respondents in respect of the pressures on overall power demand and density and the risk to adoption of AI by the lack of facilities able to meet these growing requirements. Indeed, some established data centre locations may perhaps become victims of their own success, as some authorities have become increasingly concerned at the power draws that facilities require and indeed the future ever-increasing power needs. The concerns focus on the impact that this may have on their grid systems and have thus introduced policies limiting data centre provision. For example, in Ireland, the Netherlands and Germany curbs have been introduced that include limiting planning permission for data centres in some zones or requiring them to contribute significant renewable energy to the grid and introduce waste heat recirculation to localities.

Upgrading the M&E environment to give up to a ten-year extension for the facility is favoured by just over two-fifths of survey participants. Interestingly, the least favoured approach was an upgrade of the M&E environment to give a minimum five-year extension suggesting that this these data centre respondents value a long-term solution for the data centre, potentially to satisfy their business commitments or ensure that user contracts can be supported by the facility.

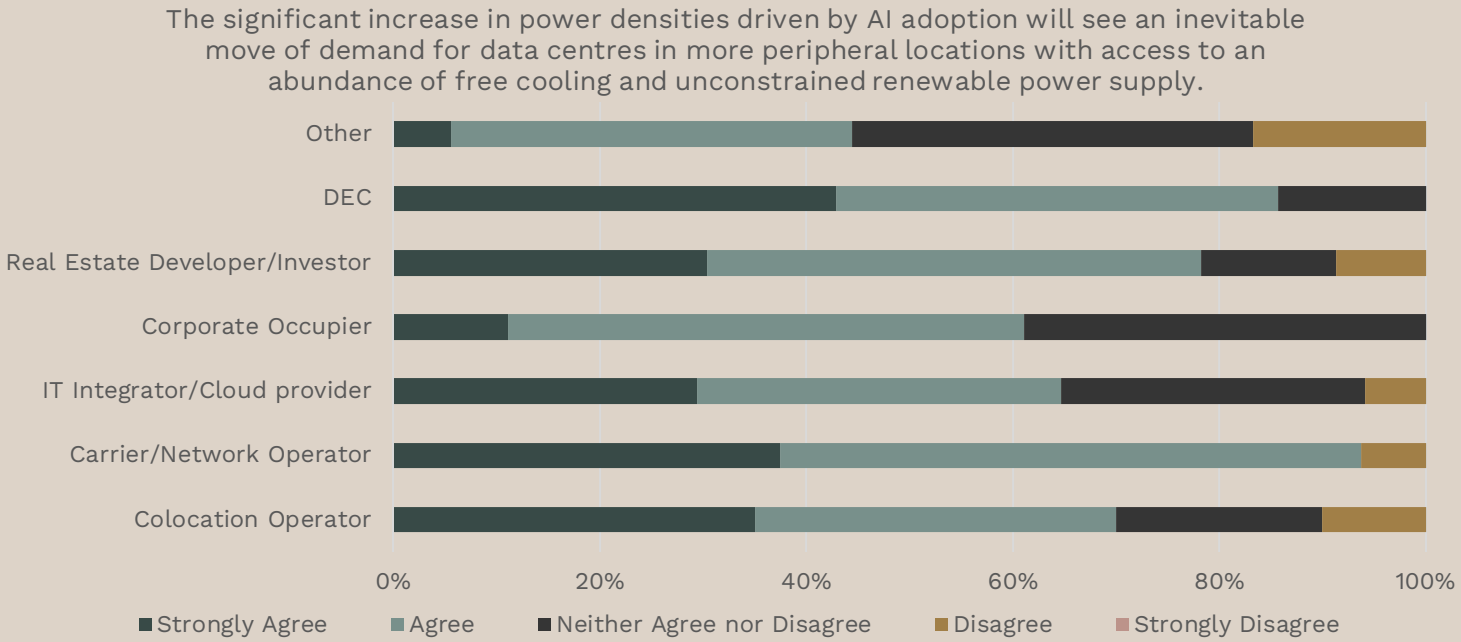
Around one-third of respondents who acted on their legacy data centre in the last two years chose to decommission those facilities. Amongst these, those who chose to move to a newly built facility (34%) slightly outnumbered those who moved to an existing data centre (31%). Amongst our service providers, the retrofitting of key M&E areas or upgrading mains power are the most cited choices, with around half stating these to be the case. In contrast, for our end users the most favoured approaches are the decommissioning of the legacy data centre and move to an existing facility/new facility.

What would you consider doing?



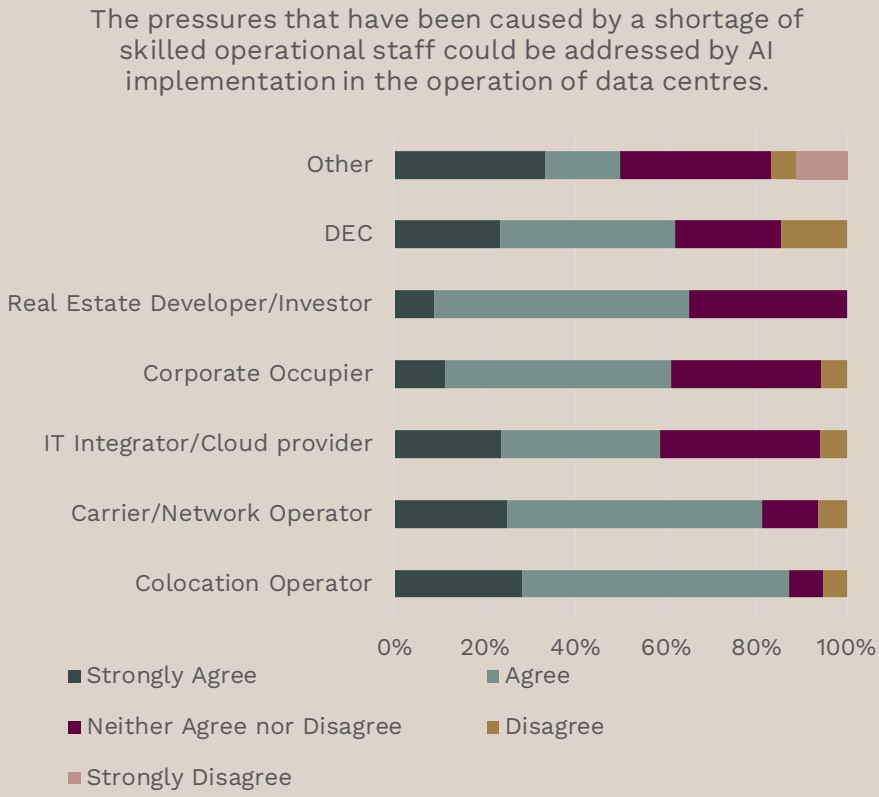
Looking forward some 56% of survey respondents agreed that they were likely to have to address a data centre with legacy issues at some point in the next three years. Amongst our service providers and end users this portion jumps to over two-thirds. When asked about how they would deal with legacy facilities in the future however, there is no clear consensus on which would be the most favoured route, although amongst the top options chosen were retrofitting key M&E areas to address ESG / CSR issues (39%), upgrading the M&E environment to give up to 10-year extension (38%) and the total decommissioning of the data centre after moving IT environment to an existing facility (37%).

The total decommissioning of a data centre after moving IT environments to new facility was cited around one-third or respondents, whilst the upgrading of mains power to the facility to improve power density and the minimum five-year extension of an upgrade M&E environment were chosen by 29% and 28% or respondents respectively.



With a focus back on gross power demands, solutions could see facilities situated in locations previously considered more peripheral, where power availability is higher. Some 70% of our respondents share the view that these peripheral locations may benefit as a result. Amongst our service providers, this proportion jumps marginally to 74% and 78% for our developer survey participants. Overall, one-in-five adopt a neutral position while only around 8% disagreed.

We questioned participants on whether they believed that the pressures that have been caused by a shortage of skilled operational staff could be addressed by AI implementation in the operation of data centres. Around 69% of our respondents believe that this will help. Amongst our colocation operators, carrier/network operators and IT integrators/cloud providers this proportion rises to around 80%. Interestingly amongst the respondent groups that are most closely aligned to design and build sector – developers and DEC professionals – these proportions are slightly lower at around 66% and 63% respectively.

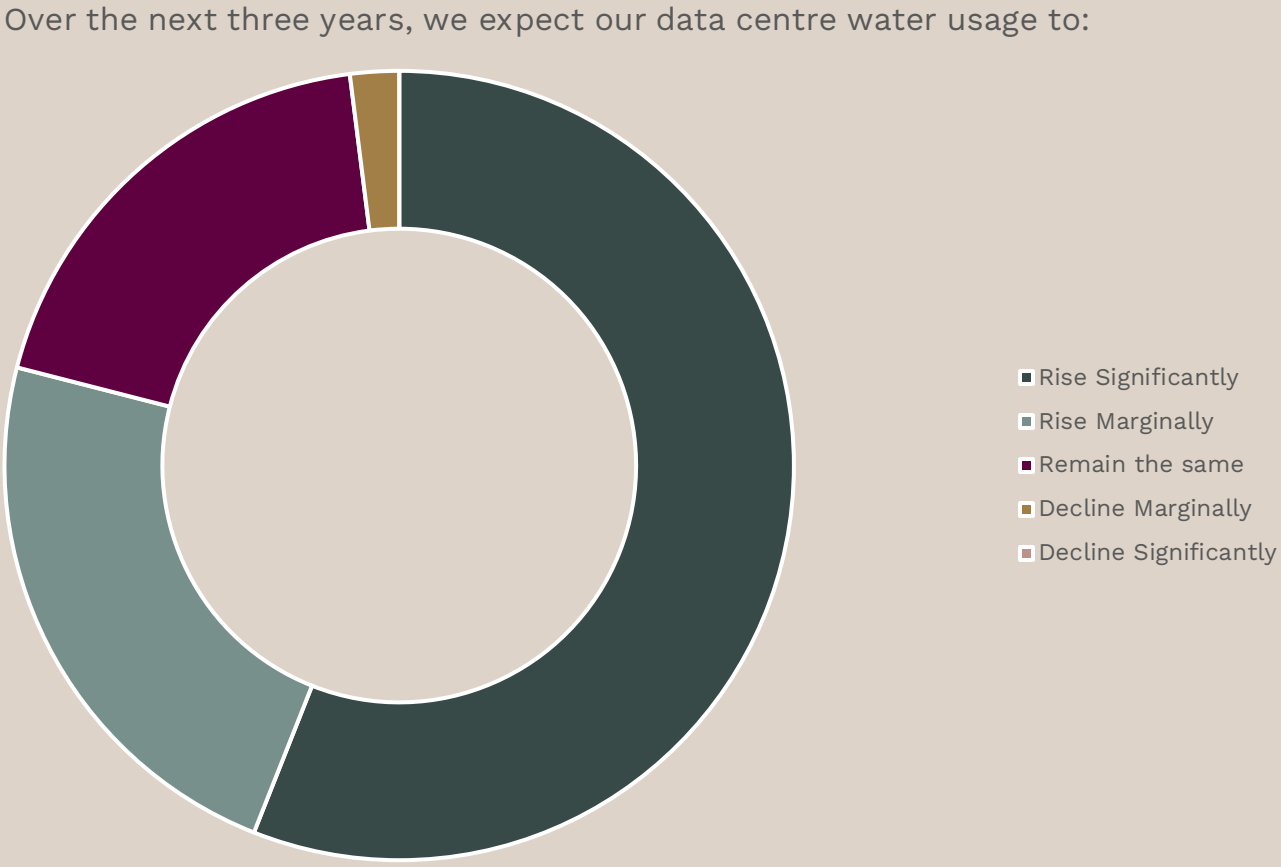


Water usage problems ahead?

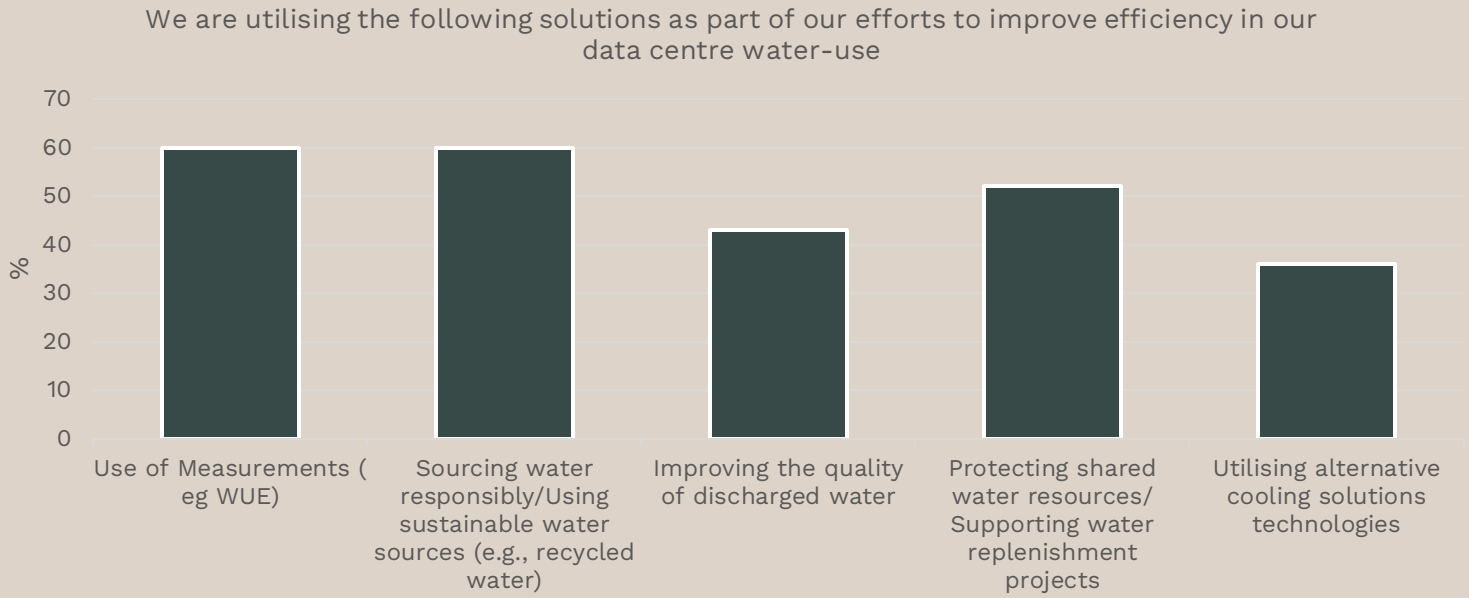
We have noted the increase in power requirements that is expected to sustain the offerings in data centres, but the industry is recognising that there is also a consequential increase in expected water usage. Data centres already can use a considerable amount of water for their cooling processes, and the proliferation of AI applications and subsequent increase in power densities needed for high-performance processes could in turn drive even greater water-cooling capacity.

For example, in its 2023 environmental report, tech giant Google reported that its global data centre fleet consumed 5.6 billion gallons of water in 2022, an increase on the 4.3 billion gallons of water in 2021. According to Shaolei Ren, an Associate Professor of Electrical and Computer Engineering at the University of California, Riverside, this 20% jump in water consumption is roughly in line with the increase in Google's compute capacity, which he attributed to having been largely driven by AI.

This potential upward pressure on water usage is also reflected by our latest survey findings. Amongst our respondents some 79% stated that they expect their water usage to rise over the course of the next three years, and over half (55%) suggested that the degree of increase would be significant. Whilst around one-fifth adopted a more neutral position just 2% suggested that their water usage would decline.



Amongst our service providers, some 86% believe that their water usage will rise over the period and almost all developers suggest the same. For end users, the picture is more mixed; with 61% suggesting usage will grow, 28% believe it will remain static and 11% suggest it will decline. Again, this end-user profile may well reflect the continuing popularity of a move to third-party providers for their IT solutions amongst this group, moving the consideration for delivering high density cooling environments and the consequential water demand onto others.



As with increased power growth, the data centre industry must address any environmental impact that may arise from increasing water usage, and importantly seek solutions to drive greater efficiencies in its water cycle to minimise this growth. When asked about measures that our respondents currently engage, all suggested that they employ more than one approach.

The top two measures our respondents cited were Use of measurements such as Water usage effectiveness (WUE) and Sourcing water responsibly/Using sustainable water sources, with around 60% noting they employed these methods. Just over half cited protecting shared water resources/ supporting water replenishment projects, and around two-fifths cited Improving the quality of discharged water. Perhaps unsurprisingly, only a third stated that they had Utilised alternative cooling solutions technologies, although as we continue to monitor this area, we would expect more consideration for avoiding the use of water to appear.

Amongst our developer respondents, all options are rated considerably higher than the overall respondent base, perhaps unsurprising given their position gives them more responsibility to develop solutions from scratch, driven by the need to deliver new stock that is fit for purpose and future-proofed for users. Nearly four-fifths reported they can source water responsibly/utilising sustainable water sources.

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MEET THE EXPERTS

IF YOU WOULD LIKE TO HEAR MORE, PLEASE GET IN TOUCH

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